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**Index  
to  
NASA Tech Briefs**

1970

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February 1971

National Aeronautics and Space Administration

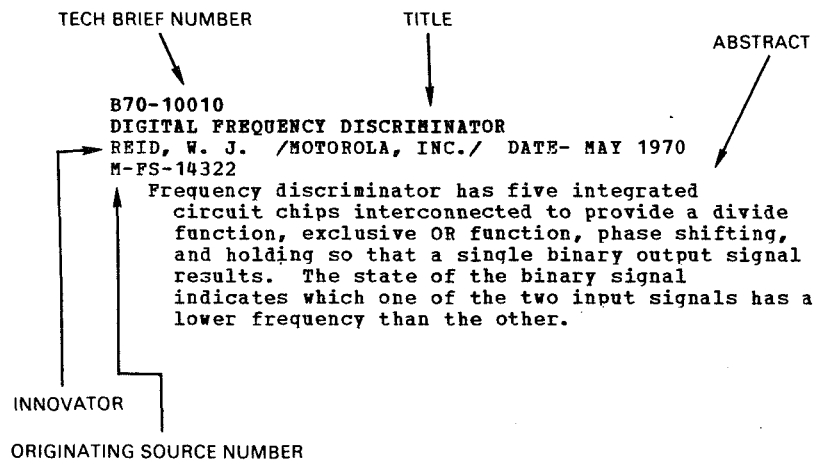
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# Introduction

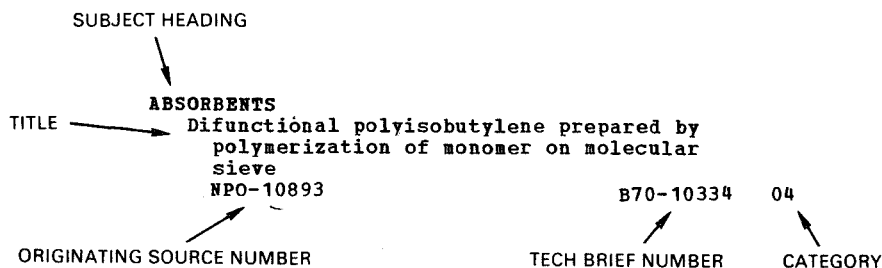
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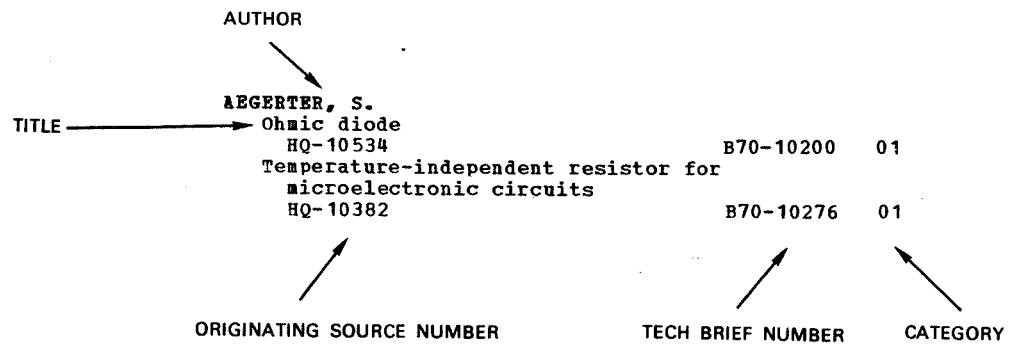


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# 01 ELECTRONICS/ELECTRICAL

B70-10003

FUSE AND SWITCH FUNCTIONS COMBINED WITHIN  
A SINGLE HOUSING  
COHN, E. M. MAXWELL, P. T. DATE- SEP. 1970  
HQ-10497

Fuswitch provides both switch and fuse functions within a single housing. A mercury capillary is used to alternately vaporize and condense the mercury within a reservoir. The housing is impervious to mercury and the fuse portion of the device operates on the principle of the self-healing mercury fuse.

B70-10005

BUCK-BOOST DC VOLTAGE REGULATOR  
LA VIGNA, T. DATE- JUN. 1970  
GSFC-10735

Circuit provides voltage regulation through a wide range of operating frequencies without intervals of high power dissipation.

B70-10010

DIGITAL FREQUENCY DISCRIMINATOR  
REID, W. J. /MOTOROLA, INC./ DATE- MAY 1970  
M-FS-14322

Frequency discriminator has five integrated circuit chips interconnected to provide a divide function, exclusive OR function, phase shifting, and holding so that a single binary output signal results. The state of the binary signal indicates which one of the two input signals has a lower frequency than the other.

B70-10016

ECONOMICAL WEATHERPROOF HELICAL ANTENNA  
CRIBB, H. E. DATE- JUL. 1970  
XKS-08485

Semi-rigid coaxial cable forms the helical element of antennas. Antennas are inexpensive, corrosion resistant, require minimum maintenance, and can be easily transported and assembled.

B70-10018

IMPROVED BEAM-LEAD INTERCONNECTION  
STRUCTURE FOR UNCASSED INTEGRATED CIRCUIT  
CHIPS  
MARLEY, J. /ITT FEDERAL LABS./ DATE- JUL. 1970  
LANGLEY-10227

Interconnection structure eliminates several levels of manually made interconnections and shortens the path lengths from generator to load, permitting reduction in consumed power.

B70-10021

SEVERAL NEW CATALYSTS FOR REDUCTION OF  
OXYGEN IN FUEL CELLS  
CATTABRIGA, R. A. /TYCO LABS., INC./ COHN, E. M.  
GINER, J. D. MAKRIDES, A. C. SWETTE, L. L.  
DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-97624  
HQ-10452 HQ-10453 HQ-10454

Test results prove nickel carbide or nitride, nickel-cobalt carbide, titanium carbide or nitride, and intermetallic compounds of the transition or noble metals to be efficient electrocatalysts for oxygen reduction in alkaline electrolytes in low temperature fuel cells.

B70-10022

SOLID STATE SWITCH PROVIDES HIGH  
INPUT-TO-OUTPUT ISOLATION  
MAGEE, R. L. /GE/ TROWBRIDGE, L. E. DATE- APR.  
1970  
HQ-10488

Switch uses a combination of N-channel and P-channel Metal Oxide Semiconductor Field Effect Transistors /MOSFET/ to obtain a normally open switch with no power applied. Series-shunt-series MOSFET switching achieves high input-output isolation.

B70-10024

ELECTRODYNAMIC INDUCTION FLOWMETER  
MELCHER, J. A. /MIT/ DATE- JUN. 1970

HQ-10230

Device determines velocity and electrical conductivity of a moving fluid of high electrical resistance by imposing a transverse electro-quasistatic field on the fluid. Position changes of charge accumulations induced within the fluid by the field are sensed by relative movement between fluid and sensor.

B70-10025

A RANGE-RATE EXTRACTION UNIT FOR DETERMINING  
DOPPLER EFFECT  
SPON- INNOVATOR NOT GIVEN /GEN. DYN./  
ASTRONAUTICS/ DATE- APR. 1970 REAN- SEE ALSO  
NASA-CR-107905  
GSFC-10750

Active ranging technique devised for VHF or S-band radar systems divides target Doppler frequency by counter-generated number that is proportional to transmitting frequency, thus producing target velocity data in terms of speed and distance relative to target transponder.

B70-10029

IMPROVED SILICON SOLAR CELLS  
KAUTZ, H. E. DATE- MAY 1970  
LEWIS-10964

Redistribution of phosphorus within the n-type layers of n-on-p silicon solar cells results in significant improvements in cell performance. Electrical current output is increased, reduction in current output due to radiation damage is lessened, and very shallow junctions are no longer needed.

B70-10033

A SIMPLE TESTER PROVIDES RESONANT FREQUENCY  
MEASUREMENTS OF FERRITE DEVICES  
CLAUSS, R. C. DATE- JUL. 1970  
NPO-10678

Tester enables direct measurement of the resonant frequency of an yttrium iron garnet disk. The disk is tested while mounted on the isolator strip with less regard for dimensional flaws.

B70-10034

ACTIVE RESISTANCE CAPACITANCE FILTER DESIGN  
KERWIN, W. J. DATE- MAY 1970  
ARC-10020

Filters, formed by combinations of distributed RC elements with positive-feedback voltage amplifiers, provide transfer functions similar to those the heavier LC filters ordinarily employ. They also provide signal amplification.

B70-10035

NICKEL-SILVER COMPOSITION SHOWS PROMISE AS  
CATALYST FOR HYDROGEN-OXYGEN FUEL CELLS  
MAGERL, J. A. /ALLIS-CHALMERS RES. DIV./ MURRAY,  
J. N. DATE- JUN. 1970  
HQ-10565

Carburized 3-1 nickel-silver preparation exhibits considerable catalytic activity, although not as high as platinum black. Cost and availability factors warrant further evaluation of nickel-silver materials.

B70-10039

HIGH-RESOLUTION SPECTRAL ANALYSIS  
GILLMORE, W. F., JR. DATE- JUL. 1970  
NPO-10748

Analyzer extends the range and resolution of a digital spectrum analyzer without placing stringent stability requirements on the sampling rate. It compares an unknown signal with a stable frequency standard.

B70-10043

DATA ACQUISITION FROM HIGH-SPEED ROTATING  
SHAFTS  
LESCO, D. J. NIEBERDING, W. C. STURMAN, J. C.  
DATE- JUN. 1970 REAN- SEE ALSO NASA-TN-D-5678  
LEWIS-10886

Data system, when used with a rotary transformer, results in increased life, negligible noise, and capability for a large number of data channels in testing rotating equipment. It is used to multiplex many channels of analog transducer output data and convert this signal to binary

B70-10045

digital output.

B70-10045

COMMUTATING BRUSHES TESTED IN DC MOTORS  
IN DRY ARGON ATMOSPHERES

BERNSTEIN, G. J. COLEMAN, L. F. SLAWECKI, M. A.  
DATE- JAN. 1970 REAN- SEE ALSO ANL-7262

ARG-10243

Test apparatus, procedures, and results are given for dc-motor brushes operating in dry argon. Minimum concentrations of argon impurities are also determined.

B70-10046

CONSTANT-VOLTAGE DRIVE CURRENT-STEERING  
SWITCH

CAPLETTE, R. K. DATE- JUL. 1970  
NPO-10743

Two-element voltage control system regulates a magnetic switch consisting of dual ferrite-core shift registers. The system has a magnetic, two-core-per-bit, voltage-controlled shift register.

B70-10049

HIGH-FREQUENCY WATTAGE-TO-VOLTAGE CONVERTER

VRANCIK, J. E. DATE- JUN. 1970 REAN- SEE ALSO  
NASA-TN-D-5674  
LEWIS-10822

Solid state device, which measures electric power over a wide frequency range, multiplies two electrical input signals to produce an output voltage that is proportional to their product. Quarter-square type of electronic analog multiplier is used.

B70-10051

BLOCK ENCODERS FOR REED-MULLER CODES

ANDERSON, T. O. DATE- SEP. 1970  
NPO-10629 NPO-10636

Encoding algorithms generate a 32 x 64-bit matrix Reed-Muller code from a 6-bit orthogonal code-word. This increases error-free reception by a high rate telemetry channel under adverse signal noise with minimal use of additional hardware.

B70-10053

WIDE-RANGE PULSE-HEIGHT DISCRIMINATOR

CANCRO, C. A. GARRAHAN, N. M. DATE- SEP. 1970  
GSFC-10837

Improved pulse amplitude discriminator has discriminator level in millivolt range, permits simple adjustment over wide range, and is stable within one percent at temperatures between minus 20 degrees and plus 60 degrees C. The discriminator responds to narrow pulses /500 nsec/, draws little power /milliwatts/, and requires simple circuitry.

B70-10057

MASS SPECTROMETER DETECTS HIGH MOLECULAR  
WEIGHT COMPONENTS

HERZOG, R. F. /GCA CORP./ DATE- JUL. 1970  
HQ-10477

Monopole mass spectrometer uses sweep method to detect vacuum system contaminants. Method requires little increase of total scanning time.

B70-10059

MECHANISM OF OPERATION OF THE TFE-BONDED  
GAS-DIFFUSION ELECTRODE

GINER, J. /TYCO LABS., INC./ HUNTER, C. /MIT/  
DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-97624  
HQ-10536

Mathematical analytical model predicts the performance of an electrode as a function of certain measurable physical characteristics. Concept assumes the catalyst particles form porous electrically conductive agglomerates which are completely flooded with electrolyte.

B70-10064

GENERAL TECHNIQUE FOR MEASUREMENT OF  
REFRACTIVE INDEX VARIATIONS

SPON- INNOVATOR NOT GIVEN /STANFORD UNIV./ DATE-  
JUN. 1970 REAN- SEE ALSO NASA-CR-95479  
HQ-10359

Time variation of amplitude and phase

fluctuations, impressed on waves propagating through a medium which has a randomly varying refractive index, is used to examine isolated regions along the line of propagation. Technique employs only one antenna at each end of the line.

B70-10065

A STABILIZED LOW-FREQUENCY

ALTERNATING-CURRENT ELECTRIC ARC

LANZO, C. D. DATE- MAY 1970 REAN- SEE ALSO  
NASA-TN-X-52424  
LEWIS-10442

Establishing an arc between water-cooled tungsten-tipped electrodes, maintaining the arc along the centerline of a central jet of argon gas, and surrounding the argon jet with a coaxial sheath of nitrogen stabilizes operation of a low-frequency ac electric arc.

B70-10070

STRANDED SUPERCONDUCTING CABLE OF IMPROVED  
DESIGN

BROOKS, J. LAVERICK, C. LOBELL, G. PURCELL, J.  
DATE- APR. 1970  
ARG-90108

High-current cable developed in liquid helium cooled magnets uses aluminum wire interspersed with the superconductor strands. The aluminum maintains higher electrical conductivity, is light in weight, and has low thermal capacity.

B70-10073

CONTINUOUSLY VARIABLE VOLTAGE-CONTROLLED  
PHASE SHIFTER

JOHNS, C. E. DATE- JUN. 1970  
NPO-11129

Phase shifter circuit adjusts the phase relationship between a locally generated reference frequency and a received RF signal applied to a phase-coherent detector. It is small enough to be integrated into a receiver subassembly and operates on command from remote control panels.

B70-10074

IMPROVED SOLID STATE ELECTRON-CHARGE-STORAGE  
DEVICE

KUPER, A. B. /CASE WESTERN RESERVE UNIV./ DATE-  
JAN. 1970 REAN- SEE ALSO NASA-CR-90046  
HQ-10152

Storage device is applicable in memory systems and in high-resolution arrays for light-responsive image sensing. The device offers high yield in multiple arrays and allows charge release with light striking only the edge of a metal electrode.

B70-10075

NEW TRANSVERSE PIEZORESISTANCE AND PINCH  
EFFECT ELECTROMECHANICAL TRANSDUCERS - A  
CONCEPT

PITTELLI, E. RINDER, W. DATE- SEP. 1970  
ERC-10088

Device, under longitudinal bias, responds to pressure input with a transverse voltage proportional to the pressure signal. In the absence of a signal, the transverse voltage is zero even with bias, and, regardless of temperature, if the transverse contacts are appropriately positioned along a zero-pressure equipotential.

B70-10076

IMPROVED LOW COST AC-TO-DC CONVERTER

CREMER, H. C. DATE- JUN. 1970  
NPO-11055

Circuit converts an rms, ac voltage to a proportional dc voltage with good accuracy over a voltage range of approximately 6-1. It incorporates a pair of vacuum thermocouples in a dc feedback circuit.

B70-10079

TELEMETRY FOR IMPACT ACCELERATION  
MEASUREMENTS

HARRISON, D. R. DATE- APR. 1970  
ARC-10289

Telemetry package uses three separate FM/AM transmitters, one for each axis of measurement. Three AM receivers and a tape recorder are used for receiving, demodulating, and recording the

acceleration signal.

B70-10082  
SUPERCONDUCTING \*\*TRANSISTOR\*\* ACTS AS  
HIGH-SPEED SWITCH  
MEISSNER, H. /STEVENS INST. OF TECH./ DATE- DEC.  
1970  
HQ-10547

Cryogenic, three-terminal device yields  
current-voltage characteristics of ordinary  
transistor. Device consists of two  
superconducting tin rods in a crossed-wire  
geometry, separated by a thin gold film. New  
construction technique is described and possible  
applications are discussed.

B70-10096  
SIGNAL CONDITIONER CIRCUIT FOR  
PHOTOMULTIPLIER TUBE  
CELLIER, A. /TEX. INSTR. INC./ HOOVER, W. M.  
DATE- JAN. 1970  
XLA-10773

Miniaturized circuit improves measurement of  
radiation dose absorbed in a scintillation  
crystal. The temperature coefficient of the  
field-effect transistor gate-source voltage in the  
isolation amplifier can be readily controlled.

B70-10097  
FOAMING-ELECTROLYTE FUEL CELL  
NANIS, L. /PA. UNIV./ SAUNDERS, A. P. DATE-  
JAN. 1970  
HQ-10147

Foam structure feeds fuel gas solution into  
electrolyte. Fuel gas reacts at static,  
three-phase interface between fuel gas,  
electrolyte, and electrode material. The foam  
forms an electrical contact between main body of  
electrolyte and the electrode, and aids in removal  
of by-products of the chemical reaction.

B70-10109  
IMPROVED QUICK-DISCONNECT ELECTRICAL  
CONNECTOR  
HORTON, R. F. DATE- FEB. 1970  
M-FS-20610

Electrical connector is fitted with an O ring,  
moisture-proof seal, is shielded in both the mated  
and unmated positions, and is equipped with one  
keying and three locking spheres.

B70-10117  
INTEGRATED CIRCUIT FLAT-PACK LEAD BENDER  
KOSTER, C. H. /LOCKHEED ELECTRON. CO./ DATE-  
JUL. 1970  
MSC-13489

Tool bends leads quickly and accurately for  
mounting on printed circuit boards. It has  
grooves and bend-angles aligned for particular  
circuit board applications.

B70-10118  
ACOUSTIC VIBRATION TEST DETECTS  
INTERMITTENT ELECTRICAL DISCONTINUITIES  
GRIEVE, S. M. /W. AM. ROCKWELL CORP./ ROBERTS,  
D. E. DATE- APR. 1970  
MSC-15158

Nondestructive test method detects faulty  
electrical connections in inaccessible or hidden  
portions of electronic harness assemblies and  
connectors. Method employs readily available  
commercial equipment.

B70-10119  
GRAPHICAL METHOD TO PREDICT THE DYNAMIC  
RESPONSE OF FM RECEIVERS  
MERZ, K. /BOEING CO./ DATE- JUN. 1970  
KSC-10111

Graphical method determines the rms threshold  
point, saturation point, and operating points for  
an FM receiver utilizing various modulation  
indices and degrees of submodulation.

B70-10123  
HOLOGRAPHIC STRESS ANALYSIS  
WILLIAMS, J. R. DATE- JUN. 1970  
M-FS-20687

Device for nondestructive testing of soldered  
joints correlates stress with load to predict

printed circuit board lifetime.

B70-10141  
PULSE RATES RECORDED BY DIGITAL FILM  
POSITIONER  
GLASS, I. S. /MIT/ RICHARD, K. F. DATE- APR.  
1970  
HQ-10358

System converts detector pulse rates to  
photographs of binary scale indicator lights on  
continuously moving film. The system then scans  
the film and transfers the data to  
computer-compatible magnetic tape.

B70-10142  
HIGHLY STABLE BIASED AMPLIFIER AND  
STRETCHER SYSTEM  
RODDICK, R. G. DATE- FEB. 1970  
ARG-10354

Amplifier and stretcher system, which minimizes  
thermal effects and compensates for  
repetition-rate effects, maintains resolution  
levels in spectrum analysis. An additional  
inverting amplifier is used in the system to  
provide a noiseless charge restorer.

B70-10145  
NEW ELECTROCATALYSTS FOR HYDROGEN-OXYGEN  
FUEL CELLS  
CATTABRIGA, R. GINER, J. /TYCO LABS., INC./  
PARRY, J. SWETTE, L. DATE- FEB. 1970 REAN- SEE  
ALSO NASA-CR-97624  
HQ-10537

Platinum-silver, palladium-gold, and platinum-gold  
alloys serve as oxygen reduction catalysts in  
high-current-density cells. Catalysts were tested  
on polytetrafluoroethylene-bonded cathodes and a  
hydrogen anode at an operating cell temperature of  
80 degrees C.

B70-10148  
DIFFUSION TECHNIQUE FOR LITHIUM-DOPED  
SILICON  
KENDALL, D. L. /TEX. INSTR., INC./ DATE- JUN.  
1970 REAN- SEE ALSO NASA-CR-97077  
GSFC-10827

Sample is doped by constructing a sandwich of five  
slices of silicon with lithium dopant deposited on  
the outside surfaces of the second and fourth  
slices and placing the sample in the middle.  
Upon heating, the lithium diffuses through the  
carrier slices and into the sample wafer.

B70-10149  
TESTING DEVICE FOR VERIFYING THE  
PERFORMANCE OF DIGITAL RECORDERS  
WILSON, W. C. /BOEING CO./ DATE- JUN. 1970  
KSC-10300

Test device, consisting of a pulse generator  
section and a manual program section, checks and  
calibrates digital recorder-printers. It is  
adaptable to other recorder configurations.

B70-10150  
DETERMINATION OF DIFFUSION LENGTHS IN  
SILICON BY AN X-RAY METHOD  
LANNACK, J. H., JR. DATE- SEP. 1970 REAN- SEE  
ALSO NASA-TM-X-1894  
LEWIS-10984

By calibrating X-ray machine with cells of known  
diffusion lengths, measurements on test cells can  
be made at rate of one every two minutes with  
standard deviation of less than two percent. Test  
cells are compared with calibration cells whose  
diffusion lengths have been measured by an  
electron beam method.

B70-10151  
HIGH ENERGY DENSITY ELECTROCHEMICAL CELL  
BYRNE, J. J. /MONSANTO RES. CORP./ WILLIAMS, D.  
L. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-90547  
LEWIS-10969

Primary cell has an anode of lithium, a cathode  
containing dihaloisocyanuric acid, and a  
nonaqueous electrolyte comprised of a solution of  
lithium perchlorate in methyl formate. It  
produces an energy density of 213 watt hrs/lb and  
can achieve a high current density.

B70-10153

B70-10153

IMPROVED ALKALINE ELECTROCHEMICAL CELL  
FLEISCHMANN, C. W. /LEESONA MOOS LAB./ OSWIN, H.  
G. OXLEY, J. E. DATE- FEB. 1970  
GSFC-10792

Addition of lead ions to electrolyte suppresses zinc dendrite formation during charging cycle. A soluble lead salt can be added directly or metallic lead can be incorporated in the zinc electrode and allowed to dissolve into the electrolyte.

B70-10154

A NEW LOW-EXPANSION NONFLAMMABLE PRINTED  
CIRCUIT BOARD

KENNEDY, B. W. DATE- MAY 1970  
M-FS-20408

Printed circuit board has a thermal coefficient of expansion similar to that of the electronic component leads. High-expansion composite materials are sandwiched between the outer layers of copper and woven fiber glass.

B70-10157

PIEZOELECTRIC TRANSDUCER

CONRAGAN, J. /CALIF. UNIV./ MULLER, R. S. DATE-  
JUL. 1970  
HQ-10548

Transducer consists of a hybrid thin film and a piezoelectric transistor that acts as a stress-sensitive device with built-in gain. It provides a stress/strain transducer that incorporates a signal amplification stage and sensor in a single package.

B70-10172

A VAPOR BARRIER FOR COLD TESTING PRINTED  
CIRCUIT CARDS

CROSS, D. A. /BOEING CO./ MC NEILL, R. E. DATE-  
APR. 1970  
M-FS-15115

Cold testing method prevents formation of frost on printed circuit boards and part holders during testing at sub-zero temperatures. Freon permits rapid attainment of the required testing temperature.

B70-10174

ELECTRONIC POSITION INDICATOR FOR LATCHING  
SOLENOID VALVES

FISCHER, R. FRYE, R. J. WIMMER, H. L. DATE-  
APR. 1970 REAN- SEE ALSO NASA-TN-X-1760  
LEWIS-10926

Electronic circuit connected to solenoid valve coils visually indicates the position of the valve stem. Transient suppression is provided to prevent damaging voltage spikes.

B70-10179

A 225 MHZ FM OSCILLATOR WITH RESPONSE TO  
10 MHZ

SPON- INNOVATOR NOT GIVEN /AUBURN UNIV./ DATE-  
JUN. 1970  
M-FS-14977

Frequency-modulated transistor oscillator is used in wideband television transmitters. It provides near-sinusoidal output waveforms and has good frequency stability.

B70-10180

AUDIO SIGNAL PROCESSOR

HYMER, R. DATE- JUN. 1970  
MSC-12223

System provides automatic volume control for an audio amplifier or a voice communication system without introducing noise surges during pauses in the input, and without losing the initial signal when the input resumes.

B70-10181

TRANSISTOR BONDING PAD CONFIGURATION FOR  
UNIFORM INJECTION AND LOW INDUCTANCE

JACOBSON, D. S. /RCA/ DATE- MAY 1970  
GSFC-10790

Modification of process for fabricating transistors, which comprises a metallization-pattern design for emitter and base areas together with a double bonding configuration for each emitter and base-bonding lead, improves

uniformity of carrier injection in transistors and of reducing lead inductances at base-emitter terminals.

B70-10186

NONDISSIPATIVE OPTIMUM CHARGE REGULATOR

ROSEN, R. /HUGHES AIRCRAFT CO./ VITEBSKY, J. N.  
DATE- APR. 1970 REAN- SEE ALSO NASA-CR-79093  
XGS-10439

Optimum charge regulator provides constant level charge/discharge control of storage batteries. Basic power transfer and control is performed by solar panel coupled to battery through power switching circuit. Optimum controller senses battery current and modifies duty cycle of switching circuit to maximize current available to battery.

B70-10188

HALL EFFECT ENCODING OF BRUSHLESS DC MOTORS

BERARD, C. A. /RCA/ FURIA, T. J. GOLDBERG, E.  
A. GREENE, R. C. DATE- MAY 1970  
GSFC-10789

Encoding mechanism integral to the motor and using the permanent magnets embedded in the rotor eliminates the need for external devices to encode information relating the position and velocity of the rotating member.

B70-10190

DOPANT FOR SODIUM NIOBATE CAPACITOR  
DIELECTRIC

KANDLER, H. A. /TRW SYSTEMS GROUP/ RADKE, R. P.  
DATE- MAY 1970 REAN- SEE ALSO B68-10163  
MSC-11773

Sodium niobate dielectric doped with barium titanate has potential application in integrated circuits with high packing densities and voltage levels below 5 to 8 volts.

B70-10191

FUSE-HOLDER CONCEPT EXPEDITES ELECTRONIC  
COMPONENT CHANGES

WINSLOW, D. J. DATE- APR. 1970  
M-FS-20615

Mounting circuit components in fuse holders facilitates component changing and extends component life with an estimated fifty percent saving of breadboard test time. Glass sleeves of the fuse holders allow easy component identification.

B70-10192

NULL TYPE INSTRUMENT FOR SIMPLIFYING TWO  
DIMENSIONAL FIELD PLOTTING

DAMERON, C. E. WOOD, G. M., JR. DATE- APR. 1970  
XLA-08493

Vacuum tube bridge operates in two modes, tracing and fixed potential. It reduces plotting time by fifty percent and improves measurement precision.

B70-10200

OHMIC DIODE

AEGERTER, S. /CALIF. UNIV. BOARD OF PAT./  
LIBBY, W. F. DATE- APR. 1970  
HQ-10534

Process produces linearly responding surface barrier diodes. Hydrogen-fired, conducting strontium titanate crystals provide linear characteristics. The process uses space charge potentials and depletion layer phenomena to achieve conduction and insulation.

B70-10203

LOW POWER HAND GATE

LIN, H. C. /WESTINGHOUSE ELEC. CORP./ DATE- APR.  
1970  
M-FS-14487

Complementary p-n-p transistor, used as the load resistor in an integrated circuit, reduces the switching time and the steady state dc current, and allows for a lower supply voltage. Current limiting is achieved by a novel unity-gain transistor.

B70-10214

SHELF AND CYCLE LIFE EVALUATION OF  
SILVER-ZINC CELLS

BOGNER, R. S. UCHIYAMA, A. A. DATE- JUL. 1970

REAN- SEE ALSO NASA-SP-132  
NPO-11258

Silver-zinc cells having a separator system of cross-linked high-density polyethylene with a methacrylic acid graft withstand corrosion when subjected to thermal sterilization treatments.

B70-10216

ULTRASTABLE REFERENCE PULSER FOR  
HIGH-RESOLUTION SPECTROMETERS

BRENNER, R. LENKSZUS, F. R. SIFTER, L. L.  
STRAUSS, M. G. DATE- APR. 1970

ARG-10364

Solid-state double-pulse generator for a high resolution semiconductor detector meets specific requirements for resolution /0.05 percent/, amplitude range /0.1-13 MeV/, and repetition rate /0.1-1000 pulses per second/. A tag pulse is generated in coincidence with each reference pulse.

B70-10217

IMPROVED SHIELDING TERMINATION ADAPTER  
FOR ELECTRICAL CABLE CONNECTORS

VANASSE, M. A. /N. AM. ROCKWELL CORP./ DATE-  
APR. 1970

MSC-15565

Termination adapter replaces braid ring and ensures permanent attachment and grounding of sheath wires. The inner ferrule of the termination is slipped inside the exposed ends of the sheath wires and the outer ferrule is placed over the wires and crimped in place to secure the wires for grounding.

B70-10218

TECHNIQUE FOR PRODUCING BIPOLAR AND MOS  
FIELD EFFECT TRANSISTORS ON A SINGLE CHIP

GALLAGHER, R. C. /WESTINGHOUSE ELEC. CORP./  
WILLIAMS, D. W. DATE- APR. 1970

MSC-13358

Several cycles of photoetching, dopant deposition, and drive-in produce selectively-doped regions and semiconductor junctions within a single chip.

B70-10219

LIQUID LEVEL SENSOR

MATICA, S. W. /N. AM. ROCKWELL CORP./ DATE- APR.  
1970

M-FS-16648

Potentiometer-type pressure transducer improves liquid level sensing by using the pressure-induced motion of a diaphragm to alter the resistance of the sensor

B70-10229

ELECTRO-OPTICAL TIME MARKER FOR HIGH-SPEED  
CAMERAS

COPELAND, J. T., JR. DATE- OCT. 1970

KSC-10294

Electro-optical device converts high-frequency electrical pulses into permanent optical records on film. Accurate, well defined images are formed of electronic pulses having repetition rates greater than 10,000 pulses/sec and pulse widths of 20 microseconds or less. Small electronic switch drives a silicon carbide electroluminescent diode.

B70-10232

TWO TERMINAL CURRENT LIMITER

DOUBT, L. S. DATE- OCT. 1970

NPO-11350

Two terminal device protects dc electronic circuits and experimental solid state devices, and replaces fuses and circuit breakers directly. The device consists of two transistors and two resistors and draws its necessary supply voltage from power source being protected. The limiter acts as a voltage regulator.

B70-10237

IMPROVED ULTRAVIOLET RESONANCE LAMP

BASS, A. M. /NBS/ DATE- SEP. 1970

ARC-10030

Removal of the seal area from the path of the lamp discharge eliminates the gradual deterioration of lithium fluoride window surfaces from condensation of products formed by interaction of a resonant

rare-gas discharge with window sealing materials. The discharge is confined to the inner tube.

B70-10247

OPTICALLY ACTIVATED MAGNETIC RECORDING TAPE

MARKS, A. M. /MARKS POLARIZED CORP./ SHULMAN, A.  
DATE- NOV. 1970

GSFC-10275 GSFC-10276

Optically activated data storage medium visually and electromagnetically reproduces a recorded signal. In an electric field, particles in heat-fluidized thermoplastic layer form a visible image of the recorded signal. Refluidizing the thermoplastic layer erases the signals. Very high data packing densities are achieved.

B70-10249

A MINIATURE 1/4-INCH DIAMETER 24-PIN  
PLUG AND RECEPTACLE

PHELPS, W. R. DATE- AUG. 1970

LANGLEY-10607

Miniature plug and receptacle, which eliminates the need for permanent fixed leads, is used on wind-tunnel force balances, in the interface connections of microelectronic modular assemblies, and in electric and electronic systems where subsystems must be removed or interchanged.

B70-10250

SWITCHING CIRCUITS WITH FAST RESPONSE AND  
LOW POWER DRAIN

CANCRO, C. A. DATE- SEP. 1970

GSFC-10878

New logic circuits have response times no longer than 10 nanoseconds and drain only milliwatts of power. The family includes AND and NAND gates and forms the basis of all logic functions. The basic circuits are used in various types of digital-data-processing systems.

B70-10262

POWER SEMICONDUCTOR DEVICE WITH NEGATIVE  
THERMAL FEEDBACK

BORKY, J. M. /MIT/ THORNTON, R. D. DATE- DEC.  
1970

HQ-10577

Composite power semiconductor avoids second breakdown and provides stable operation. It consists of an array of parallel-connected integrated circuits fabricated in a single chip. The output power device and associated low-level amplifier are closely coupled thermally, so that they have a predetermined temperature relationship.

B70-10264

COLOR IDENTIFICATION TESTING DEVICE

BRAWNER, E. /BENDIX CORP./ MARTIN, R. PATE, W.  
DATE- APR. 1970

KSC-10278

Testing device, which determines ability of a technician to identify color-coded electric wires, is superior to standard color blindness tests. It tests speed of wire selection, detects partial color blindness, allows rapid testing, and may be administered by a color blind person.

B70-10266

MOTOR BRUSH WEAR MEASURED WITH STRAIN GAGES

FARRELL, W. T. /RCA/ PEEK, C. R. DATE- MAY 1970

GSFC-10886

Balanced bridge circuit, supplied with low-voltage direct current and connected to a readout device, measures remaining brush material, rate of brush wear, armature runout, and brush signature.

B70-10267

EQUIPMENT-TOLERANT RANGE CODE DEMODULATION

METHOD - A CONCEPT

WELTER, N. /MOTOROLA, INC./ DATE- OCT. 1970

M-FS-13987

Demodulation loop of automatic range-measuring system uses reference signal wave of locally generated pseudo-noise plus square wave of same period as the clock. Phase instabilities in IF amplifiers appear only as gain changes in the loop, and do not cause errors in range determination.

B70-10275

B70-10275  
AN INVESTIGATION OF THE STRENGTH OF  
ALUMINUM WIRE USED IN INTERGRATED CIRCUITS  
ADAMS, M. A. DATE- AUG. 1970  
NPO-11219

Microloop pull test is developed to stress wire loops in situ until failure. The applied loads, the nature of the fracture, and its location are recorded. This test also stresses the wire bonds.

B70-10276  
TEMPERATURE-INDEPENDENT RESISTOR FOR  
MICROELECTRONIC CIRCUITS  
AEGERTER, S. /CALIF. UNIV./ LIBBY, W. F. DATE-  
MAY 1970  
HQ-10382

Heat treating insulating crystals in gaseous hydrogen atmosphere produce resistive device which is temperature-independent from 77 to 295 degrees K. Increasing the concentration of hydrogen within the crystal yields semiconductor, hybrid, and metallic conduction characteristics which are combined with a depletion layer at the surface.

B70-10277  
FILM BREAKERS PREVENT MIGRATION OF AQUEOUS  
POTASSIUM HYDROXIDE IN FUEL CELLS  
HESS, P. D. /ALLIS-CHALMERS MANUFACTURING CO./  
DATE- MAY 1970  
MSC-13174

Electrolyte film breakers made from polytetrafluoroethylene are installed in the reactant and water vapor removal outlets of each cell and sealed by elastomers. Use of these devices in the water vapor removal cavity outlets prevents loss of KOH solution through film migration during water removal.

B70-10278  
P-I-N DIODE SWITCH  
VANEK, C. S. DATE- APR. 1970  
GSFC-10661

Solid state switches use the same voltage and power supply as the RF amplifier. This simplifies circuit design and reduces input power requirements.

B70-10286  
REMOTELY ACTUATED RELEASE MECHANISM  
ROTTA, J. W., JR. DATE- MAY 1970  
NPO-10698

Release mechanism for actuation of automatic device operates on system of restrained energy force, which is automatically released by electrical charge that may be applied by manual switch or, in remote application, by RF impulse, received by conventional electronic circuitry.

B70-10298  
HALL EFFECT TRANSDUCER GIVES ELECTRICAL  
OUTPUT PROPORTIONAL TO METER SHAFT  
ROTATION  
SMITH, D. DATE- JUN. 1970  
LANGLEY-10620

Electrical output transducer for measuring angular displacements does not introduce frictional contact between stationary and moving parts. It produces output voltages directly proportional to small rotary shaft displacements.

B70-10303  
SIMPLE, ACCURATE TEMPERATURE-MEASURING  
INSTRUMENT  
MC FADIN, L. W. DATE- DEC. 1970  
MSC-12327

Compact instrument, composed of integrated circuits and a temperature-sensitive platinum resistor, measures temperature over a wide dynamic range. Ultimate accuracy is limited by nonlinearity of the platinum resistor. With proper calibration and current regulation to within 0.01 percent, a measurement accuracy of 0.05 percent can be achieved.

B70-10304  
AN EXPLOSION-PROOF BATTERY CASE  
KEATHLEY, W. H. DATE- DEC. 1970  
MSC-12335

Battery case, equipped with relief valve, connector, and two covers, separates the explosive mixture from all potential spark sources. Bottom ends of vent tubes are cemented into cell vents and upper ends fit through the gas barrier cover. This arrangement isolates generated gases from the electric power.

B70-10305  
ONE-SHOT MULTIVIBRATOR WITH COMPLEMENTARY  
METAL-OXIDE-SEMICONDUCTOR COMPONENTS  
ONEILL, R. W. /LOCKHEED ELECTRON. CO./ DATE-  
APR. 1970  
MSC-13492

Breadboard model is tuned to produce output pulses from one microsecond up to several seconds in width with up to 95 percent duty cycle, and with lower power consumption than previously existing circuits.

B70-10314  
TWO TECHNIQUES FOR DIGITAL FILTER DESIGN  
CARROLL, C. C. /AUBURN UNIV./ JONES, J. W., JR.  
NAGLE, H. T., JR. DATE- AUG. 1970  
M-PS-20015 M-PS-20016

Digital controllers, one using a special-purpose computer and the other using a combination of digital and analog techniques, are designed around /1/ computers that simulate the transfer function and interface with the system, and /2/ analog and digital circuits, converters, amplifiers, constant multipliers, and delay lines that form a digital filter.

B70-10323  
COULOMETER BATTERY STATE-OF-CHARGE INDICATOR  
BIRCHENOUGH, A. SECUNDE, R. DATE- NOV. 1970  
REAN- SEE ALSO NASA-TN-D-5773  
LEWIS-11083

Mercury-column electrochemical coulometer is a linear ampere-hour integrating device consisting of a sealed glass tube containing two columns of mercury separated by a gap containing an electrolyte. The drive circuit uses operational amplifier techniques to match nonlinear charge-discharge characteristics of an alkaline battery.

B70-10326  
STRAIN GAGE LOAD MEASURING DEVICE - A  
CONCEPT  
HICKEY, F. E. /NORTHROP VENTURA/ DATE- SEP. 1970  
MSC-13385

Instrumenting tape members of textile parachutes to determine load capability is accomplished by mounting strain-gage instrumented metal plates to the tape by stiff rubber pads. The pads permit gradual transfer of the load from the tape to the plates without stress concentrations in the tape.

B70-10328  
SAFE/ARMED EXPLOSIVE SQUIB  
PARKER, L. C. DATE- JUN. 1970  
XLA-10372

Safe/Armed Firing-Type Initiator /SAFTI/ combines the safety features of existing electromechanical safe-arm devices with the weight and size of a standard initiator and the functioning speed of a relay.

B70-10329  
LOW PRESSURE ARC ELECTRODE  
LENN, P. D. /ELECTRO-OPT. SYSTEMS, INC./  
RICHTER, R. DATE- AUG. 1970  
ARC-10012

Reducing the pressure in the vicinity of the arc attachment point by allowing the gas to flow through a supersonic nozzle minimizes local heating rates, prevents ablation, and increases the efficiency of coaxial gas-flow arcs.

B70-10335  
SELF-CONTAINED MINIATURE ELECTRONICS  
TRANSCIVER PROVIDES VOICE COMMUNICATION  
IN HAZARDOUS ENVIRONMENT  
CRIBB, H. E. DATE- SEP. 1970  
KSC-10164

Two-way wireless voice communications system is automatic, provides freedom of movement, allows



for complete awareness of the environment, and does not present any additional hazards such as activation of electromagnetic sensitive devices.

## B70-10336

PENTAL CIRCUIT MAY BE USED IN  
CONVERSIONLESS DECIMAL COUNTER  
GALVIN, D. H., JR. /MIT/ DATE- JUN. 1970  
HQ-10146

Pental counter circuit, a five-stage ring of NOR gates, is used with a standard flip-flop and several AND gates to construct a decimal counter. Pental circuit eliminates the conversion circuitry which is used when binary circuits generate numeric information.

## B70-10337

A SELF-TUNING FILTER  
DEBOO, G. J. HEDLUND, R. C. DATE- JUL. 1970  
ARC-10264

Self-tuning filter automatically adjusts its center frequency to track signal frequency. This permits the use of a filter with a bandwidth smaller than the range of input signal frequencies.

## B70-10338

CONSTANT-AMPLITUDE RC OSCILLATOR  
KERWIN, W. J. WESTBROOK, R. M. DATE- SEP. 1970  
ARC-10262

Sinusoidal oscillator has a frequency determined by resistance-capacitance /RC/ values of two charge control devices and a constant-amplitude voltage independent of frequency and RC values. RC elements provide either voltage-control, resistance-control, or capacitance-control of the frequency.

## B70-10340

A BATTERY SIMULATOR  
FERRELL, S., JR. /BOEING CO./ LAHR, N. DATE-  
AUG. 1970  
KSC-10172

Simulator verifies proper operation of a battery cell voltage-monitoring device. It also contains variable ac voltage to ascertain that a battery scanner will perform its function at all possible ac voltages.

## B70-10345

TWO-AXIS FLUX GATE MAGNETOMETER  
ACUNA, M. H. /FAIRCHILD HILLER CORP./ PELLERIN,  
C. J. DATE- NOV. 1970  
GSFC-10441

Magnetometer uses single sensing head to measure magnetic flux density along two axes simultaneously. The sensor head consists of permalloy core and four windings. Two windings perform a multivibrator function, the two remaining windings sense magnetic fields. The smaller magnetometer performs same functions as more complex devices.

## B70-10351

A TRANSFORMER OF CLOSELY SPACED PULSED  
WAVEFORMS  
NIEDRA, J. DATE- AUG. 1970 REAN- SEE ALSO  
NASA-TN-D-5473  
LEWIS-11045

Passive circuit, using diodes, transistors, and magnetic cores, transforms the voltage of repetitive positive or negative pulses. It combines a pulse transformer with switching devices to effect a resonant flux reset and can transform various pulsed waveforms that have a nonzero average value and are relatively closely spaced in time.

## B70-10365

REDUCING STREAK FILE DATA VIA ELECTRONIC  
CROSS CORRELATOR  
DICKERSON, R. A. /N. AM. ROCKWELL CORP./ DATE-  
SEP. 1970  
M-FS-18804

Continuous /nonframing/ motion picture projector, two photocells, a cross-correlator, and a ground glass screen where the photocells intercept the stream image determine the time delay between successive streak images. Velocities

corresponding to the streaks are determined from the delay together with the distance separating the photocells.

## B70-10370

PULSE-RATE AVERAGING CIRCUIT  
JESSEE, R. D. /WESTINGHOUSE ELEC. CORP./ DATE-  
SEP. 1970  
GSFC-10718

Averaging circuit provides a secondary control signal during inoperative periods of an intermittent primary control system. It can also provide an average pulse rate over a fixed time interval, such as in a digital frequency meter.

## B70-10372

INTEGRATED CIRCUIT RANDOM-ACCESS MEMORY  
DECODER  
KATZ, S. /RCA/ DATE- OCT. 1970 REAN- SEE ALSO  
NASA-CR-86115  
ERC-10211

Decoder circuit with complementary-symmetry circuit configuration composed of MOS and n-p-n bipolar devices minimizes power consumption. Emitter-follower drive scheme results in low power dissipation and high speed operation.

## B70-10373

COMPLEMENTARY-MOS BINARY COUNTER WITH  
PARALLEL-SET INPUTS  
KELLER, K. R. /RCA/ YUNG, A. K. DATE- SEP. 1970  
REAN- SEE ALSO NASA-CR-86171  
ERC-10122

Metal oxide semiconductor four-stage binary counter contains reset capability as well as four parallel-set inputs gated in by a logic signal. Parallel-set inputs permit setting the counter into any of sixteen possible states.

## B70-10376

RADIOMETRIC ABSOLUTE NOISE-TEMPERATURE  
MEASUREMENT SYSTEM FEATURES IMPROVED  
ACCURACY AND CALIBRATION EASE  
BROWN, W. EWEN, H. /EWEN KNIGHT CORP./  
HAROULES, G. DATE- SEP. 1970 REAN- SEE ALSO  
NASA-TR-R-271  
ERC-90066

Radiometric receiver system, which measures noise temperatures in degrees Kelvin, does not require cryogenic noise sources for routine operation. It eliminates radiometer calibration errors associated with RF attenuation measurements. Calibrated noise source is required only for laboratory adjustment and calibration.

## B70-10378

COPLANAR INTERCONNECTION MODULE  
STEWART, R. D. /GE/ WINDSOR, H. F. DATE- AUG.  
1970 REAN- SEE ALSO NASA-CR-86039  
ERC-10237

Module for interconnecting a semiconductor array to external leads or components incorporates a metal external heat sink for cooling the array. Heat sink, extending down from the molded block that supports the array, is immersed in a liquid nitrogen bath which is designed to maintain the desired array temperature.

## B70-10380

CONTACT MATERIAL FOR PRESSURE-SINTERING  
FERRITES  
WENTWORTH, C. /RCA/ DATE- SEP. 1970  
ERC-10213

Pressure-sintering, in which the unfired laminated ferrite plane is placed between two flat punches and pressed during firing, reduces lateral firing shrinkage to less than one percent. A decrease in thickness of the laminate produces the required volume shrinkage. Phlogopite is the most suitable contact material investigated.

## B70-10382

BIMORPH PIEZOELECTRIC DEVICE FUNCTIONS AS  
FLAPPER VALVE  
VAN DER HEYDEN, J. /MARTIN MARIETTA CORP./ DATE-  
SEP. 1970 REAN- SEE ALSO NASA-CR-86105  
ERC-10082

Flapper valve using a bimorph piezoelectric ceramic bender converts an electrical input into

B70-10383

a pneumatic output signal capable of operating fluidic logic elements in a decoder and display system.

B70-10383

SOLID STATE BISTABLE POWER SWITCH  
BARTKO, J. /ISOTOPES INC./ SHULMAN, H. DATE-  
SEP. 1970 REAN- SEE ALSO NASA-CR-86103  
ERC-10290

Tin and copper provide high current and switching time capabilities for high-current resettable fuses. They show the best performance for trip current and degree of reliability, and have low coefficients of thermal expansion.

B70-10384

QUASI-OPTICAL EQUIVALENT OF WAVEGUIDE SLIDE  
SCREW TUNER  
KURPIS, G. P. /CUTLER-HAMMER AIRBORNE INSTR.  
LAB./ DATE- AUG. 1970 REAN- SEE ALSO  
NASA-CR-1453  
ERC-10312

Tuner utilizes a metal plated dielectric grid inserted into the cross sectional plane of an oversized waveguide. It provides both variable susceptance and variable longitudinal position along the waveguide to provide a wide matching range.

B70-10385

NONEQUAL ITERATION DIRECTIONAL FILTERS  
PERMIT SELECTIVE CLEARANCE OF RIPPLES  
IN PASSBAND CIRCUITS  
KURPIS, G. P. /CUTLER-HAMMER AIRBORNE INSTR.  
LAB./ DATE- AUG. 1970 REAN- SEE ALSO  
NASA-CR-1453  
ERC-10313

Modified directional filter is comprised of alternate pairs of dielectric and air gap filter sections with unequal electrical lengths. Filter provides more flexibility in choosing dielectric material thickness and permits switching from specially ground to standard thicknesses.

B70-10387

FLAT CONDUCTOR CABLE CONNECTOR WITH  
CONTACT SEPARATION SEAL  
ANGELE, W. DATE- AUG. 1970 REAN- SEE ALSO  
NASA-SP-5043, NASA-SP-5924/01/  
M-FS-20757

Cable connector is developed in which each pair of contact elements is isolated by plastic cells and the mating interface is sealed by an elastic gasket. So insulated, the connector may be operated under high vacuum conditions at voltages up to 600 V ac without electrical leakage or intercontact ionization.

B70-10392

DUAL CURRENT READOUT FOR PRECISION PLATING  
ICELAND, W. F. /N. AM. ROCKWELL CORP./ DATE-  
SEP. 1970  
MSC-15673

Bistable amplifier prevents damage in the low range circuitry of a dual scale ammeter. It senses the current and switches automatically to the high range circuitry as the current rises above a preset level.

B70-10393

SIGNAL PHASE SWITCHES OFFER GREATER  
DYNAMIC RANGE  
CROW, R. B. DATE- OCT. 1970 REAN- SEE ALSO  
NASA-CR-90199  
NPO-10709

Circuit, placed in the signal path of a closed-loop receiver to modulate telemetered data in the 10-MHz spectrum, improves signal-to-noise ratio by 3 db in a communication receiver. The switch enables bandwidth reduction which reduces noise overload on the following stages, giving the system greater dynamic range.

B70-10407

THUMB-ACTUATED CONTROL DEVICE  
HADLAND, W. O. IWASAKI, N. DATE- SEP. 1970  
ARC-10019

Rotary potentiometer device on the spoke of an aircraft steering wheel provides servo control of

certain flight characteristics with no visual attention and a minimum of operational movement.

B70-10414

TRANSISTOR CURRENT AND VOLTAGE LIMITING  
SWITCH  
HILBERT, E. E. DATE- SEP. 1970  
NPO-11166

Limiting circuit protects the main power supply of electronic modules and limits the current drawn by each module should a short circuit occur. It limits current within one mA when used with direct current of either polarity, or with pulse or ac power sources from direct current to 100 KHz.

B70-10425

EFFICIENT/RELIABLE DC-TO-DC INVERTER CIRCUIT  
PASCUTT, E. R. DATE- NOV. 1970 REAN- SEE ALSO  
NASA-TM-X-63118  
XGS-06226

Feedback loop, which contains an inductor in series with a saturable reactor, is added to a standard inverter circuit to permit the inverter power transistors to be switched in a controlled and efficient manner. This inverter is applicable where the power source has either high or low impedance properties.

B70-10437

LASER SCRIBING OF SILICON WAFERS  
CALIHAN, C. /SPACERAYS, INC./ DATE- OCT. 1970  
ERC-10386

Laser scribing eliminates microcracking at scribe line intersections, minimizes or eliminates preparation of scribe channels, and increases yield during the breaking process. Rapid overlapping of spots in the form of a line permits scribing speeds of 1.5 to 2.5 in./sec at 50 pulses/sec.

B70-10440

LUMINESCENT SCREEN COMPOSITION AND  
APPARATUS  
HILBORN, E. H. DATE- OCT. 1970  
ERC-10010

Ultraviolet light projects photographically produced images on a screen composed of a mixture of linear and nonlinear phosphors whose spectral emissions are different. This allows the display of polychromatic luminescent images, which gives better discrimination of the objects being viewed.

B70-10443

CIRCULARLY POLARIZED ANTENNA WITH WIDE  
PROJECTION AND RANGE - A CONCEPT  
MAILLOUX, R. J. VAN ATTA, L. C. DATE- DEC. 1970  
ERC-10214

Slotted antenna structure consists of a combination of two conventional antenna-element patterns of simple, linearly polarized antennas. By driving the second set in phase quadrature with the first, a nearly circularly polarized beam is projected over a wide sector.

B70-10448

MULTIPORT SEMICONDUCTOR DEVICES  
HOLMSTROM, F. R. RINDNER, W. DATE- DEC. 1970  
ERC-10293

Device, made of a variety of semiconductors, incorporates three or more terminals. Between at least two terminals, switching action occurs. The other terminal pair performs either another switching function or a control function. This device is useful for computer-logic or memory applications.

B70-10454

MULTILAYER SCREEN GIVES CATHODE RAY TUBE  
HIGH CONTRAST  
BULLINGER, H. HILBORN, E. H. DATE- SEP. 1970  
ERC-10217

Fabrication method for cathode ray tubes uses low-cost siloxane resin formulations. The resins contain sufficient methyl or phenyl groups for solubility in organic solvents. After vaporization and baking, the polymerized material is stable under vacuum and under temperatures required for tube fabrication.

B70-10459

HIGH-TEMPERATURE ELECTRIC STATOR  
KUESER, P. /WESTINGHOUSE ELEC. CORP./ LINDBERG,  
R. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-1592  
LEWIS-10889

Thermal vacuum tests are conducted on high-temperature stator without a rotor. Electrical characteristics remained satisfactory during tests, insulation improved slightly, and conductor resistance remained constant. The assembly included a bore seal for hermetically sealing the stator from the rotor cavity.

B70-10460

FABRICATION OF ELECTROACOUSTIC RF AMPLIFIERS  
TRENT, R. L. DATE- SEP. 1970  
ERC-10266

Anodic bonding of a lithium niobate piezoelectric crystal over a silicon-on-sapphire structure with the crystal mounted over a closely controlled oxide provides a point-contact mount for two rectangular slabs /one piezoelectric and the other a silicon semiconductor/ within 600 A of each other.

B70-10462

ELECTRODEPOSITED INORGANIC SEPARATORS FOR  
ALKALINE BATTERIES  
CARSON, W. N., JR. /GE/ CONSIGLIO, J. A. MC  
QUADE, J. M. DATE- SEP. 1970 REAN- SEE ALSO  
NASA-CR-84002  
GSPC-10943

Coating electrodes of silver-cadmium cells with thermostable electrodeposits of calcium hydroxide or magnesium hydroxide reduces silver migration and increases cell life. Absence of organic matter enables assembled cells to be sterilized without oxidation of the material of the separators.

B70-10470

LOAD CELL FOR THERMIONIC CONVERTER TESTS  
BREITWIESER, R. MANISTA, E. J. DATE- SEP. 1970  
LEWIS-11068

Stable, low duty cycle transistorized emitter follower load cell controls and absorbs large currents at low voltages. The use of energy storage in capacitors reduces auxiliary power source requirements. Low duty cycle pulse mode of operation reduces the average power handling requirement of all components.

B70-10474

VISIBLE LIGHT ELECTROLUMINESCENT DIODES OF  
INDIUM-GALLIUM PHOSPHIDE  
CLOUGH, R. /RCA/ RICHMAN, D. TIETJEN, J. DATE-  
OCT. 1970 REAN- SEE ALSO NASA-CR-86192,  
NASA-CR-110194  
ERC-10303

Vapor deposition and acceptor impurity diffusion techniques are used to prepare indium-gallium phosphide junctions. Certain problems in preparation are overcome by altering gas flow conditions and by increasing the concentration of phosphine in the gas. A general formula is given for the alloy's composition.

B70-10476

VISUAL DISPLAY PANEL FUNCTIONS AS COMPUTER  
INPUT/OUTPUT DEVICE  
HILBORN, E. H. DATE- OCT. 1970  
ERC-10223

Display panel permits information entry and erasure using a probe, and has an inherent storage capability for use on time-shared systems. Data input need not be online. Other advantages include direct display of input and output, simplicity, and low fabrication cost.

B70-10477

GLASS-TO-METAL BONDING PROCESS IMPROVES  
STABILITY AND PERFORMANCE OF SEMICONDUCTOR  
DEVICES  
TRENT, R. L. DATE- OCT. 1970 REAN- SEE ALSO  
NASA-CR-85026  
ERC-10264

Anodic bonding of glass coverslips to photodiodes and photovoltaic devices eliminates the need for adhesive. The process requires relatively low

temperatures /less than 560 degrees C/ and the metals and glass remain solid throughout the bonding process.

B70-10482

IMPROVED MODIFIED TURNSTILE ANTENNA  
LEMSON, P. H. DATE- AUG. 1970  
MSC-12209

Improved antenna design embodies the principles of turnstiling, broadbanding, and delta dipole matching. Antenna is useful in commercial broadcast applications.

B70-10483

A CONCEPTUAL CURRENT SURGE PROTECTOR FOR  
INCANDESCENT LAMPS  
MACOMBER, G. A. /N. AM. AVIATION CORP./ DATE-  
AUG. 1970  
M-FS-16658

Negative-temperature coefficient device /thermistor/ in series with a lamp filament alleviates high filament surge current during initial application of power. The thermistor should be selected for a cold resistance approximately equal to one fourth of the normal hot resistance of the filaments to be protected.

B70-10488

ELECTRICAL TEST WIRE ATTACHMENT DEVICE  
FERRY, R. T. /BOEING CO./ RABB, L. W. DATE-  
SEP. 1970  
KSC-10562

Test lead wire attachment quickly and securely engages screw head by expansion against the side walls of the screw head slot. Heat shrinkable tubing is used for the forward and shaft ends to insulate the device from accidental contact.

B70-10492

SOLID STATE VARIABLE TIME DELAY  
FITZGERALD, T. M. DATE- NOV. 1970  
ERC-10032

Variable time delay line does not require use of a magnetic field to control a time delay, and can both amplify and delay a signal. Device is inexpensive and space saving, it does not require mechanically moving components, eliminating detrimental vibrations in a sensitive environment.

B70-10494

CONTROLLED CURRENT INDUCTORS  
THALER, S. DATE- NOV. 1970  
ERC-10139

Magnetic permeability and shape of special core inserts are varied to produce desired changes in saturation characteristics of current dependent inductor, thus improving its inductance-to-current properties. Materials and saturation levels of the core pieces are selected to permit a wide variety of relationships between inductance and current.

B70-10495

SEMICONDUCTOR COOLING BY THIN-FILM  
THERMOCOUPLES  
TICK, P. A. VILCANS, J. DATE- OCT. 1970  
ERC-10149

Thin-film, metal alloy thermocouple junctions do not rectify, change circuit impedance only slightly, and require very little increase in space. Although they are less efficient cooling devices than semiconductor junctions, they may be applied to assist conventional cooling techniques for electronic devices.

B70-10498

A POWER SEMICONDUCTOR TEST CIRCUIT WITH  
REDUCED POWER REQUIREMENTS  
BEEN, J. F. DATE- DEC. 1970  
LEWIS-11175

Switching circuit utilizing silicon controlled rectifier reduces input power requirements normally associated with testing power semiconductors in an operational type mode. Circuit alleviates problems of inaccessibility, lack of large amounts of power, physical size of power resistors, wiring, and heat generation.

B70-10499

B70-10499

**THERMIONIC TRIODE GENERATES AC POWER**

KNIAZZEH, A. G. F. SCHARZ, F. C. DATE- NOV. 1970

ERC-10284

Electrostatic grid controls conduction cycle of thermionic diode to convert low dc output voltages to high ac power without undesirable power loss. An ac voltage applied to the grid of this new thermionic triode enables it to convert heat directly into high voltage electrical power.

B70-10500

**P-N JUNCTIONS FORMED IN GALLIUM ANTIMONIDE**

CLOUGH, R. /RCA/ RICHMAN, D. TIETJEN, J. DATE- NOV. 1970

ERC-10302

Vapor phase deposition process forms a heavily doped n-region on a melt-grown p-type gallium antimonide substrate. HCl transports gallium to the reaction zone, where it combines with antimony hydride and the dopant carrier, hydrogen telluride. Temperatures as low as 400 degrees C are required.

B70-10505

**CHARACTERISTICS OF STEP-RECOVERY-DIODE**

**FREQUENCY MULTIPLIERS**

SPON- INNOVATOR NOT GIVEN /RYAN AERON. CO./ DATE- DEC. 1970

M-FS-20558

Investigation into the uses of step-recovery diodes /SRD\*s/ leads to the development of necessary circuitry for using fast current-switching capabilities of SRD\*s in frequency multiplication, the design of solid-state X-band transmitters employing SRD multipliers, and the use of SRD multipliers in a phased-array receiving antenna.

B70-10508

**LOG AMPLIFIER INSTRUMENT MEASURES  
PHYSIOLOGICAL BIOPOTENTIALS OVER WIDE  
DYNAMIC RANGE**

KADO, R. T. /CALIF. UNIV., LOS ANGELES/ DATE- NOV. 1970

ARC-10032

To record biopotentials with extreme dynamic ranges, biopotential inputs are capacitatively coupled to a miniature, low power, solid-state signal conditioner consisting of a two-stage differential preamplifier that has a low noise figure. The output of the preamplifier uses diodes to provide an overall gain which is nearly logarithmic.

B70-10511

**METAL DETECTOR SYSTEM**

LEE, R. D. DATE- NOV. 1970

ARC-10265

Signal voltage resulting from the disturbance of an electromagnetic field within the volume of a sensitive area is compared with a reference ac voltage for polarity information, which identifies the material. System output amplitude and polarity indicate approximate size and type of metal, respectively.

B70-10515

**FAULT DETECTION MONITOR CIRCUIT PROVIDES**

**\*\*SELF-HEAL CAPABILITY\*\* IN ELECTRONIC**

**MODULES - A CONCEPT**

KENNEDY, J. J. /IBM CORP./ DATE- SEP. 1970

KSC-10394

Self-checking technique detects defective solid state modules used in electronic test and checkout instrumentation. A ten bit register provides failure monitor and indication for 1023 comparator circuits, and the automatic fault-isolation capability permits the electronic subsystems to be repaired by replacing the defective module.

B70-10521

**EXTENDED-LIFE MAGNETIC RECORDING HEADS**

KERN, J. D. /APPL. MAGNETICS CORP./ VODICKA, V.

W. DATE- SEP. 1970

GSFC-10097

Recording head has standard ferrite core directly coated with a thin film of a magnetic alloy composed of aluminum, iron, and silicon. Coated

head has a lifespan from five to ten times longer than that of conventional heads and shows superior inductance characteristics and frequency response.

B70-10524

**LATCHING OVERCURRENT CIRCUIT BREAKER**

MOORE, M. L. DATE- SEP. 1970

NPO-11131

Circuit breaker consists of a preset current amplitude sensor, and a lamp-photo-resistor combination in a feedback arrangement which energizes a power switching relay. The ac input power is removed from the load at predetermined current amplitudes.

B70-10530

**INEXPENSIVE AUTOMATIC RANGING FOR DIGITAL**

**VOLTMETERS AND FREQUENCY COUNTERS**

ROLLER, R. F. /WESTINGHOUSE ASTRONUCL. LAB./

DATE- OCT. 1970

NUC-10240

Seven integrated circuits incorporated at very low cost into frequency counters and digital voltmeters performing a voltage-to-frequency conversion permit automatic range changing. Extra decades are switched into and out of the counting chain as a function of the counter during the previous counting period.

B70-10533

**ELECTRONIC FLAW SIMULATOR FOR EDDY CURRENT**

**PROBE CALIBRATION**

ALMASY, L. J. /WESTINGHOUSE ASTRONUCL. LAB./

COWFER, C. D. DATE- OCT. 1970

NUC-10211

Electronic flaw simulator cycled into the eddy current system eliminates errors in probe calibration. A discrimination level reference established in the probe permits recognition of those flaws in materials with an equivalent volume equal to or greater than the reference.

B70-10534

**CIRCUIT MINIMIZES CURRENT DRAIN CAUSED BY**

**NEON INDICATOR LAMPS**

DRYLIE, C. D. /WESTINGHOUSE ASTRONUCL. LAB./

SHAW, W. J. DATE- OCT. 1970

NUC-10157

Circuit lights neon lamp by back leakage current of the driving transistor, rather than by the transistors saturation or \*\*on-state\*\* current, thereby eliminating lowering of the voltage necessary for indication. Circuit has operating speed greater than indication circuit using a saturation principle and aids in power rationing.

B70-10541

**CIRCUIT SUPPRESSES SPURIOUS SIDEBANDS**

READY, P. J. /TRW SYSTEMS GROUP/ DATE- NOV. 1970

MSC-13425

Circuitry requires modulated subcarrier to be split, part going to a phase modulator, and part going to a new circuit which utilizes a square law detector, a balanced mixer, and an amplifier to remove spurious sidebands. A summer recombines the two outputs, and final signal no longer includes spurs.

B70-10552

**HIGH-TEMPERATURE, LONG-TERM DRIFT OF**

**PLATINUM-RHODIUM THERMOCOUPLES**

SZANISZLO, A. J. DATE- OCT. 1970 REAN- SEE ALSO

NASA-TN-D-5287

LEWIS-11111

Contamination of thermocouples is minimized by use of pure alumina insulators and a controlled low-impurity-level high-vacuum environment. Average thermal electromotive force change for platinum-rhodium thermocouples was -2.8 deg K after 3700 hours exposure to a mean temperature of 1530 deg K.

B70-10553

**CONNECTOR LOCKING DEVICE**

RABB, L. W. /BOEING CO./ DATE- DEC. 1970

KSC-10537

Slidable spring-loaded locking device eliminates need for safety wiring. Locking device is placed between the connector plug and connector

receptacle. The threaded plug cannot vibrate loose because the insert is wedged into slots formed on the outer diameter of the receptacle.

B70-10560  
ECONOMICAL PRINTED CIRCUIT FRONT PANEL FOR  
COMPUTER USE  
NEWMAN, J. /IBM/ DATE- NOV. 1970 REAN- SEE ALSO  
B70-10561  
KSC-10573

Techniques for preparing printed circuit boards are used to provide an alternate method for producing panel symbology for ground computer test trap. After processing, the panel unit is either solder or gold plated.

B70-10562  
DIGITAL INPUT IS BUFFERED TO REAL-TIME  
ANALOG DISPLAY  
BOWER, K. F. DATE- NOV. 1970  
KSC-10397

Buffering technique utilizes nine-bit binary counter and holding register of eight flip-flops. These flip-flops form the memory device that allows precise asynchronous conversion of the digital source data. Counter generates a waveform which is passed through a low pass filter to recover data in analog form.

B70-10565  
REDUNDANT ELECTRONIC CIRCUIT PROVIDES  
FAIL-SAFE CONTROL  
ARCHER, J. W. /AEROJET-GEN. CORP./ DATE- NOV. 1970  
NUC-10389

Circuit using dual control amplifiers and dual position demand potentiometers powered from separate sources is used for reliable hydraulic valve controller that prevents closure of valve when control circuits fail, and maintains valve control to close tolerance for more common modes of controller failure.

B70-10569  
FLEXIBLE ELECTRICAL CONDUCTORS FOR  
HIGH-TEMPERATURE SWITCHGEAR  
KOUTNIK, E. A. MUELLER, L. A. SNIDER, W. E.  
DATE- OCT. 1970 REAN- SEE ALSO NASA-TM-X-1986  
LEWIS-11109

Arch-shaped conductors fabricated from flat strips of beryllium oxide dispersion-strengthened copper alloy serve as flexible electrical connectors capable of operating in 1000 deg F temperature range, under vacuum conditions for periods of 10,000 hours or more without failure.

B70-10570  
HIGH-ACCURACY DETECTOR FOR LASER RADAR  
AMMON, G. /RCA CORP./ DATE- NOV. 1970 REAN- SEE  
ALSO NASA-CR-92485  
MSC-13275

Signal processing technique permits accurate timing of pulse position independent of pulse amplitude. Technique utilizes differentiator, limiter amplifier, Schmitt trigger, and monostable multivibrator to produce standard-width pulse whose leading edge corresponds with the maximum of the received signal. This pulse stops the range counter.

B70-10579  
SOLID STATE REMOTE CIRCUIT SELECTOR SWITCH  
PETERSON, V. S. DATE- OCT. 1970  
LEWIS-10387

Remote switching circuit utilizes voltage logic to switch on desired circuit. Circuit controls rotating multi-range pressure transducers in jet engine testing and can be used in coded remote circuit activator where sequence of switching has to occur in defined length of time to prevent false or undesired circuit activation.

B70-10584  
IMPROVED COVER FOR CADMIUM SULFIDE SOLAR  
CELLS  
ANAGNOSTOU, E. BERNATOWICZ, D. T. SPAKOWSKI, A.  
E. DATE- NOV. 1970 REAN- SEE ALSO  
NASA-TM-X-1905  
LEWIS-11003

Solar cell performance and radiation resistance is improved by application of 1-mil thickness of Teflon FEP protective material. Cells produce 30 percent more power than similar cells with conventional Kapton covers.

B70-10607  
MICROBALANCE ACCURATELY MEASURES EXTREMELY  
SMALL MASSES  
PATASHNICK, H. /DUDLEY OBS./ DATE- DEC. 1970  
HQ-09962

Oscillating fiber microbalance has a vibrating quartz fiber as balance arm to hold the mass to be weighed. Increasing fiber weight decreases its resonant frequency. Scaler and timer measure magnitude of the shift. This instrument withstands considerable physical abuse and has calibration stability at normal room temperatures.

B70-10629  
GAGE FOR MEASURING COASTAL EROSION AND  
SEDIMENTATION  
CARPINI, T. D. MOUGHON, W. C. DATE- NOV. 1970  
LANGLEY-10779

Underwater sand height gage, which measures heights up to 12 inches, is comprised of two standard flush-diaphragm pressure transducers. Gage is very sensitive to buried water heights and is useful as a research tool in study of wet earth and landslide phenomena.

B70-10630  
BONDING OF STRAIN GAGES TO FIBER REINFORCED  
COMPOSITE PLASTIC MATERIALS  
CHAMIS, C. C. HANSON, M. P. SERAFINI, T. T.  
DATE- NOV. 1970  
LEWIS-11151

Strain gage is installed during molding of composite and utilizes the adhesive properties of the matrix resin in the composite to bond the strain gage in place. Gages thus embedded provide data at all temperatures that the matrix can withstand.

B70-10643  
CONSTANT CURRENT LOAD MATCHES IMPEDANCES  
OF ELECTRONIC COMPONENTS  
ALEXANDER, R. M. /TRW SYSTEMS GROUP/ DATE- DEC. 1970  
GSFC-10982

Constant current load with negative resistance characteristics actively compensates for impedance variations in circuit components. Through a current-voltage balancing operation the internal impedance of the diodes is maintained at a constant value. This constant current load circuit can be used in simple telemetry systems.

B70-10648  
A COMPUTER PROGRAM FOR EVALUATING PROPELLANT  
HEATING AND RADIATION DOSAGE TO CREWS OF  
NUCLEAR-POWERED ROCKET VEHICLES  
LAHTI, G. P. DATE- DEC. 1970  
LEWIS-10951

Program evaluates propellant heating in a nuclear rocket stage. Program code employs infinite-medium buildup factors to calculate gamma dosage and employs the Albert-Welton kernel to calculate the fast neutron dosage.

B70-10650  
TECHNIQUE FOR LOWERING THE NOISE FIGURE IN  
RF AMPLIFIERS  
BELLONO, A. P. /MIT/ DATE- DEC. 1970  
HQ-10435

Low-level RF amplifiers are operated at noise figures at or near the theoretical minimum, while maintaining high-gain stability. Formulas for the minimum amplifier noise figure value are derived from the analytical noise-figure expression involving the parameters of the equivalent circuit representing the actual system.

B70-10651  
AC-COUPLED ULTRAHIGH INPUT IMPEDANCE  
AMPLIFIER  
BIRCHENOUGH, A. G. DATE- DEC. 1970  
LEWIS-11154

Input impedances of several hundred megohms and

input capacitances of less than one picofarad are achieved with a conventional unity gain are buffer amplifier modified by addition of positive feedback. The circuit is stable over a temperature range of 25 to 70 deg C.

**B70-10655  
THERMOCOUPLE INSTALLATION IN THIN-WALLED TUBES**

CURREN, A. N. WYCOFF, K. C. DATE- DEC. 1970  
LEWIS-11222

Brazing process attaches thermocouples to slot in type-347 stainless steel tube flush around its circumference. Electrolytic flashing with gold enhances brazing process. This installation procedure does not significantly change calibration of thermocouples used and does not cause major wear spots in the thin-walled devices.

**B70-10684  
SMALL, EFFICIENT POWER SUPPLY FOR XENON LAMPS**  
GOODWIN, J. E. /MARTIN-MARIETTA CORP./ DATE- DEC. 1970  
MSC-13637

Device, which operates from 28 V dc, has four sections, a preregulator, a dc-to-dc converter, a current regulator, and a high voltage starter. The unique characteristics of the individual sections are described.

**B70-10687  
COMPOSITE METAL-OXIDE DEVICE HAS VOLTAGE SENSITIVE CAPACITANCE**  
MATTACH, R. J. /VA. UNIV./ VIOLA, T. J., JR. DATE- DEC. 1970  
HQ-10594

Device with step function variation of the capacitance is useful for voltage-controlled oscillator circuits and as a voltage-sensitive switch. Simplicity of construction makes the device suitable for large-scale integration, microelectronic circuits.

**B70-10689  
CIRCUIT MODIFICATION AIDS IN ATOMIC PARTICLE DISCRIMINATION**  
BLUE, J. W. SHOOK, D. F. DATE- DEC. 1970  
LEWIS-11155

Circuit, using a bialkali photomultiplier tube and liquid scintillator, eliminates disadvantages of Owen circuit. It distinguishes between recoil protons /energies of 200 keV/ and Compton electrons /energies of 20 keV/.

**B70-10696  
ADVANCES IN ELECTROMETER VACUUM TUBE DESIGN**  
SPON- INNOVATOR NOT GIVEN /RAYTHEON CO./ DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-96797  
GSFC-10729 GSFC-10730 GSFC-10731

Single-ended, miniature-cathode tube with a relatively low grid current level is constructed. Adequate cathode temperature at relatively low heater power drain is provided by designing the supporting spacers to provide a square cathode hole. Method of assembling the mount and bonding the elements is discussed.

**B70-10700  
LAMP MODULATOR PROVIDES SIGNAL MAGNITUDE INDICATION**  
ZEMAN, J. R. DATE- DEC. 1970  
KSC-10565

Lamp modulator provides visible indication of presence and magnitude of an audio signal carrying voice or data. It can be made to reflect signal variations of up to 32 decibels. Lamp life is increased by use of a bypass resistor to prevent filament failure.

**B70-10702  
FERRITE ATTENUATOR MODULATION IMPROVES ANTENNA PERFORMANCE**  
HOOKS, J. C. /WESTERN ELEC. CO., INC./ LARSON, S. G. SHORKLEY, F. H. WILLIAMS, B. T. DATE- DEC. 1970  
NPO-12011

Ferrite attenuator inserted into appropriate waveguide reduces the gain of the antenna element which is causing interference. Modulating the

ferrite attenuator to change the antenna gain at the receive frequency permits ground tracking until the antenna is no longer needed.

**B70-10721  
HIGH TEMPERATURE CIRCUIT BREAKER**  
EDWARDS, R. N. /GE/ TRAVIS, E. F. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-1719  
LEWIS-90265

Alternating current circuit breaker is suitable for reliable long-term service at 1000 deg F in the vacuum conditions of outer space. Construction materials are resistant to nuclear radiation and vacuum welding. Service test conditions and results are given.

**B70-10722  
MEASUREMENT OF SURFACE ROUGHNESS SLOPE**  
CASSIDY, J. F. DONNER, H. C. DATE- DEC. 1970  
LEWIS-11080

Instrument, consisting of isolator, differentiator, absolute value circuit, and integrator, uses output signal from surface texture analyzer profile-amplifier to calculate surface roughness slope. Calculations provide accurate, instantaneous value of the slope. Instrument is inexpensive and applicable to any commercial surface texture analyzer.

**B70-10724  
MINIATURE MULTICONTACT CONNECTORS**  
HOLDEN, D. G. ROBELEN, D. B. DATE- DEC. 1970  
LANGLEY-10740

Connectors, which have 4 to 9 contacts, are engaged through a hole with a minimum diameter of 0.030 inch. They are constructed of concentric brass and nylon components assembled with a light, firm press-fit. They withstand several thousand mating cycles and each outer contact has a one ampere capacity.

## 02 ELECTRONIC/ELECTRICAL SYSTEMS

**B70-10002  
DEVICE FOR PRINTING ALPHANUMERIC LISTINGS AND DIGITAL DATA PLOTS**  
OGLESBEE, J. DATE- APR. 1970  
LEWIS-10954

Modified high-speed printer performs x-y plotting of digital data. The device produces a 7-inch square plot with any number of points in less than 25 seconds and has a resolution of 0.2 percent.

**B70-10007  
SLOW-SPEED DRIVES FOR MINIATURE DEVICES**  
BAHM, E. J. DATE- MAY 1970  
NPO-10700

Hysteresis motor minimizes motor torque variations during shaft revolution when operated at high frequency and with a sinusoidal motor current. Motor speed is stabilized by a feedback servo.

**B70-10008  
TELEMETRY RECEIVER**  
GILCHRIST, C. GOLDSTEIN, R. MATHISON, R. DATE- AUG. 1970  
NPO-10746

Communications system maintains phase lock of weak telemetry signals with a minimal expenditure of power and bandwidth. An estimate of the frequency variation as a function of time is used to achieve coherent phase demodulation.

**B70-10009  
DIGITAL DATA TRANSITION TRACKING LOOP IMPROVES DATA RECEPTION**  
ANDERSON, T. O. HURD, W. J. LINDSEY, W. C. DATE- SEP. 1970  
NPO-10844

Transition tracking loop eliminates drifts, leakages, and instabilities inherent in analog filters. Major components are the phase detector, loop filter, voltage-controlled oscillator and timing logic.

## B70-10023

## IMPROVED MAGNETRON COLD-CATHODE ION SOURCE

ROHRIG, J. /NORTON RES. CORP./ TORNEY, F.  
DATE- APR. 1970 REAN- SEE ALSO NASA-CR-66793  
LANGLEY-10387

Cold cathode ionization source generates smaller amounts of spurious gases and has a higher sensitivity than commonly used hot-filament ion sources. Photon and X-ray background noise are reduced below detectable levels.

## B70-10032

## MOUNTING, SUPPORT, AND ISOLATION OF VARIOUS COMPONENTS OF A HYDROGEN MASER

CUTLER, L. /HEWLETT PACKARD/ VAN HEYST, H.  
DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-94937  
HQ-10563 HQ-10564

Polytetrafluoroethylene tubing partially collapsed during assembly protects the shields from thermal expansion stress in isothermal and magnetic canisters. Thermal insulation between the shields is made from epoxy foam cast in position and cured under high temperature. Stacked mounting array supports the maser's hexapole magnet and hydrogen atom source.

## B70-10047

## ARRAY MULTIPLIER

WANG, G. Y. DATE- DEC. 1970  
ERC-90076

Digital array multiplier consisting of any number of identical digital adder cells in a repetitive planar configuration functions as a modular multiplier for use in computer applications of airborne vehicles. The modular multiplier utilizes large scale integration and metal oxide semiconductors.

## B70-10056

## THERMOELECTRIC RADIONETER

BEAM, B. H. RUSSELL, L. D. DATE- JUN. 1970  
ARC-10138

Radiometer measures microsecond pulses of radiant flux in the presence of electromagnetic noise. It consists of a charged capacitor that delivers a voltage pulse proportional to the thermally induced depolarization of its polymeric dielectric.

## B70-10060

## RANGING CODE PROCESSOR

ANDERSON, T. O. DATE- JUL. 1970  
NPO-10066

System extracts range data from pseudorandom-coded range radar used to track a moving body. Pseudorandom binary waveforms with favorable correlation properties are transmitted and their reflections received and processed. The phase difference between the received and transmitted codes gives an accurate measure of the distance to the moving body.

## B70-10069

## RADIO FREQUENCY BASEBAND RECORDING TECHNIQUE

HECKMAN, D. C. /GE/ DATE- JUN. 1970  
HQ-10317

Technique uses a helical-scan video recorder with auxiliary signal-conditioning equipment to provide an inexpensive, high-capacity magnetic tape recording of a 112 channel, phase-locked, multiplexed, baseband signal.

## B70-10086

## PRECISE AUDIO-FREQUENCY MARKERS FOR NUCLEAR MAGNETIC RESONANCE SPECTRA

COHEN, E. A. MANATT, S. L. DATE- APR. 1970  
NPO-11147

System calibrates and records the responses of a nuclear magnetic resonance spectrometer. Calibration markers which have a highly stable frequency source are utilized to maintain frequency stability.

## B70-10095

## ANTENNA-ARRAY, PHASE QUADRATURE TRACKING SYSTEM

CUBLEY, H. D. DATE- DEC. 1970

## MSC-12205

Phase relationship between input signals appearing on widely-spaced parallel connected antenna elements in array is automatically adjusted in phase quadrature tracking system. Compact and lightweight design permit use in wide variety of airborne communications networks.

## B70-10098

## MULTI-FREQUENCY RESONANT ANTENNA

TEMPS, A. J., JR. /FAIRCHILD HILLER CORP./  
VISSCHER, J. DATE- AUG. 1970 REAN- SEE ALSO  
NASA-CR-82795  
HQ-10215

Antenna is simultaneously resonant at 8.75 MHz, 11.825 MHz, and 20.562 MHz. It provides a near-field radiator which has a constant current distribution across its radiating elements for each of the resonant frequencies.

## B70-10110

## ELECTRONIC SLEEP ANALYZER

FROST, J. D., JR. /BAYLOR UNIV. COLL. OF MED./  
DATE- APR. 1970  
MSC-13282

Electronic instrument automatically monitors the stages of sleep of a human subject. The analyzer provides a series of discrete voltage steps with each step corresponding to a clinical assessment of level of consciousness. It is based on the operation of an EEG and requires very little telemetry bandwidth or time.

## B70-10112

## ANALYSIS AND OPTIMIZATION OF AN OMNIDIRECTIONAL DIRECTION-FINDING SYSTEM

BESTE, J. H. /AUBURN UNIV./ GRAF, E. R. DATE-  
APR. 1970  
M-FS-14346

System determines the direction of arrival of an electromagnetic wave with the direction information in a readily usable form. It presents a relatively small physical structure and does not require mechanical positioning.

## B70-10115

## NEW PROCEDURE FOR DESIGN OF SELF-ADAPTIVE CONTROL SYSTEMS

HOFMANN, L. G. /SYSTEMS TECHNOL., INC./ DATE-  
FEB. 1970 REAN- SEE ALSO NASA-CR-1152  
LANGLEY-10255

Adaptive control system compensates for changes in the dynamic characteristics of linear controlled elements. It is mechanized so that the actual input of each control approaches the ideal input.

## B70-10128

## WAVEFORM SIMULATOR SYNTHESIZES COMPLEX FUNCTIONS

MALMBERG, J. /GULF GEN. ATOMIC, INC./ MOORE, C.  
DATE- JUN. 1970  
NPO-10251

Multichannel apparatus produces or simulates a complex curve which can be viewed on an oscilloscope display surface and can be adjusted to match an original complex experimentally produced curve.

## B70-10138

## ELECTRON ENERGY ANALYZER

SAMSON, J. A. R. /GCA CORP./ DATE- JUN. 1970  
HQ-10373

Electrostatic deflection analyzer with three spherically concentric grids allows production of electrons within a small volume at the center of the inner sphere. By applying a retarding potential between the middle and inner spheres, the energies of the electrons can be measured.

## B70-10143

## LASER-DOPPLER GAS VELOMETER

HUFFAKER, R. M. DATE- APR. 1970  
M-FS-20583

Three dimensional laser Doppler instrument measures both local mean and fluctuating gas velocity of air flow. Technique is used for measuring atmospheric wind velocity and turbulence. Under certain conditions liquid flows can be measured.

B70-10147

B70-10147

SOLID-STATE AC-TO-DC CONVERTER  
MONROE, C. M. /GE/ DATE- JUN. 1970  
HQ-10545

Converter uses solid-state ac-to-dc rectification circuitry, filter circuitry, a tuned transformer, ac chopper circuitry, and an automatic current-control network. It has a dc power source which operates from 5 to 100 percent load at a 72 to 94 input to output efficiency.

B70-10152

PERFORMANCE-LIMIT CRITERIA FOR THE DESIGN  
OF FAST-RESPONSE SERVO-ACTUATION SYSTEMS  
ZELLER, J. R. DATE- FEB. 1970 REAN- SEE ALSO  
NASA-TN-D-5388  
LEWIS-11022

Analysis of a typical nonlinear electrohydraulic servo-model establishes the dynamic-performance capabilities of servo-actuation systems.

B70-10159

BURST SYNCHRONIZATION DETECTION SYSTEM  
LIPOMA, P. C. /LOCKHEED ELECTRON. CORP./ SEAY,  
B. P., JR. DATE- APR. 1970  
MSC-90317

System uses digital logic and a voltage-controlled oscillator to obtain appropriate horizontal and vertical sync signals from the sync bursts contained in the original transmitted signal. It is useful in systems that exhibit considerable single amplitude fluctuation.

B70-10161

PRECISION FULL-WAVE RECTIFIER  
DEBOO, G. J. HEDLUND, R. C. DATE- APR. 1970  
ARC-10101

Simplified circuit uses one operational amplifier and two precision resistors. The amplifier is operated open loop for switching and closed loop for linear gain, both simultaneously.

B70-10163

COMMUNICATIONS LINK FOR SDS 900 SERIES  
COMPUTERS  
LAYLAND, J. W. MARTIN, W. L. ZYGIEBAUM, A. I.  
DATE- SEP. 1970  
NPO-11161

High speed, self-clocking single channel control and data link apparatus interfaces between two computers. This combined system reduces data errors.

B70-10164

CONSTANT CURRENT SOURCE FOR CONVERTING  
ABSOLUTE TEMPERATURES TO ANALOG VOLTAGES  
PADILLA, J. R. DATE- SEP. 1970  
NPO-10733

Circuit configuration consisting of matched differential amplifier, temperature compensated zener diode, and low pinch-off-voltage field effect transistor provides accurate and stable current supply for temperature sensor devices.

B70-10169

REDUCTION OF BACKGROUND IN AN X-RAY  
PROPORTIONAL COUNTER  
GORENSTEIN, P. /AM. SCI. AND ENG., INC./  
MICKIEWICZ, S. P. DATE- AUG. 1970 REAN- SEE ALSO  
NASA-CR-96716  
HQ-10253

Proportional counter has increased sensitivity for high resolution X-ray surveys. It locates weak cosmic X-ray sources while reducing non-X-ray background.

B70-10195

VOLTAGE REGULATOR WITH MULTIPLE PARALLEL  
POWER SOURCE SECTIONS  
BINKLEY, W. G. /TRW SYSTEMS GROUP/ WRIGHT, W.  
H. DATE- APR. 1970  
GSFC-10891

Voltage regulator provides improved voltage-regulating system in which power dissipation and consequent heat generation are minimized. Each power source section is controlled sequentially so that only one operates in a linear range at a time.

B70-10196

LASER ALTIMETER  
KOLKER, M. /RAYTHEON CORP./ DATE- AUG. 1970  
M-FS-13691

Ruby laser operating at 6943 angstroms at the heart of an electronic ranging system provides a highly accurate range measurement to an extremely small area.

B70-10211

HIGH EFFICIENCY OPTICAL BEAMSPLITTER  
DESIGNED FOR OPERATION IN THE INFRARED  
REGION  
BASTIEN, R. C. /PERKIN-ELMER CORP./ HEINRICH, P.  
L. DATE- SEP. 1970  
GSFC-10721

Beamsplitter system uses potassium bromide as substrate for operating in the spectral region between 5 and 30 microns and calcium fluoride for narrowband applications. It uses a 13-layer film which yields nearly equal broadband infrared reflectance and transmittance.

B70-10212

SIMPLIFIED METHOD FOR MEASURING THE  
IMPEDANCE OF RF POWER SOURCES - A CONCEPT  
OAKLEY, E. C. DATE- SEP. 1970  
NPO-10734

Bolometer detector and bridge circuit measure the RF power. A varied bridge reference resistor achieves maximum power transfer allowing the output impedance of the RF source to be determined from the known circuit parameters.

B70-10220

ECONOMIC GAS CHROMATOGRAPH SYSTEM FOR  
SUBAMBIENT PRESSURE GAS SAMPLING  
MITCHELL, S. M. /N. AM. ROCKWELL CORP./ DATE-  
JUL. 1970  
M-FS-16298

Gas chromatograph sampling system consists of a manifold with a gas-sample valve, a minimum-volume pressure transducer with a portable monitor, a vacuum-source valve, and a sample inlet valve. Increased accuracy of analysis is obtained by better control of sample size.

B70-10234

BRUSHLESS DIRECT-CURRENT MOTORS  
BAHM, E. DATE- SEP. 1970 REAN- SEE ALSO  
NASA-CR-106071  
NPO-11351

Survey results are presented on the use of unconventional motor windings and switching sequences to optimize performance of brushless dc motors. A motor was built, each coil terminal having a separate, accessible lead. With the shaft and all electronics excluded, length and outside diameter measured 1.25 and 0.75 in., respectively.

B70-10238

DESIGN PROCEDURE FOR IMPROVED ACTIVE FILTERS  
GUSSOW, S. /SPERRY RAND CORP./ WEATHERS, G.  
DATE- DEC. 1970  
M-FS-20445

Synthesis technique for active filters gives high degree of accuracy for frequencies as high as 500 kHz and covers frequencies most used for telemetry. Frequency response can be realized within few percent of specified cutoff frequencies without need for tuning.

B70-10239

REGULATED-CURRENT DC POWER SUPPLY FOR  
GASEOUS-DISCHARGE LAMPS  
FREEMAN, W. HUGUENIN, D. DATE- SEP. 1970  
GSFC-10293

Controlled current source having a high output resistance feeds continuous-flow hydrogen lamps in vacuum-ultraviolet photometric equipment. The power supply, also used with low-pressure sealed lamps, has a short recovery time and smooth regulation without overshoot.

B70-10242

BLOCK-CODED COMMUNICATIONS  
LINDSEY, W. C. DATE- OCT. 1970 REAN- SEE ALSO  
NASA-CR-105796



NPO-11397

Theory for block-coded telemetry systems is useful in testing performance of one- and two-way, phase-coherent telemetry systems when double-conversion, superheterodyne, phase-locked receiver, preceded by bandpass limiter is used to track carrier.

B70-10246

OXYGEN-HYDROGEN FUEL CELL WITH AN IODINE-IODIDE CATHODE - A CONCEPT  
JAVET, P. /PA. UNIV./ DATE- SEP. 1970  
HQ-10379

Fuel cell uses a porous cathode through which is fed a solution of iodine in aqueous iodide solution, the anode is a hydrogen electrode. No activation polarization appears on the cathode because of the high exchange-current density of the iodine-iodide electrode.

B70-10263

A PROPOSED LASER MEASUREMENT SYSTEM FOR DETERMINING SURFACE CONTOUR  
NEUBERT, H. D. /GEN. DYN./ DATE- JUL. 1970  
HQ-10326

Electro-optical system can scan a large /100 ft./ antenna in 30 seconds. Comparison of the reflected signal with a reference signal from a Pockel-cell modulator driver yields a signal that can be correlated with the distance covered by the laser. A scanning arrangement then enables contour measurement.

B70-10281

FORMULAS ESTABLISH AUDIO RANGE INDUCTANCE IN BERYLLIUM COILS  
BALL, B. J. /MISS. STATE UNIV./ CATLEDGE, C. G.  
WIER, D. D. DATE- JUL. 1970 REAN- SEE ALSO  
NASA-CR-77415  
M-PS-14244

Mathematical modeling is used to determine the effects of resistance and capacitance upon the audio-inductance range of beryllium hammer coils and beryllium nylon-potted coils.

B70-10282

HIGH SPEED TELEVISION CAMERA SYSTEM PROCESSES PHOTOGRAPHIC FILM DATA FOR DIGITAL COMPUTER ANALYSIS  
HABBAL, N. A. DATE- AUG. 1970  
NPO-10745

Data acquisition system translates and processes graphical information recorded on high speed photographic film. It automatically scans the film and stores the information with a minimal use of the computer memory.

B70-10284

VERY HIGH FREQUENCY DIGITAL RANGING SYSTEM  
SOBEL, S. E. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970  
MSC-15763

Digital ranging system measures slant range /from 500 feet to 200 nautical miles/ and provides digital range readout during range tracking between any two airborne vehicles.

B70-10290

SLIDE CHECKOUT CONSOLE  
NIDES, A. S. /PHILCO-FORD CORP./ SWENINGSON, E.  
S. DATE- JUN. 1970  
MSC-12318

Semiautomatic 35-mm photographic slide checkout console optically and electronically verifies registration of slides at a minimum rate of 250/hr. The console compares slide registration with a registration standard within the console. It verifies a binary code number on the bottom of the slide and visually displays its equivalent.

B70-10332

FLUERIC-CONTROLLER PNEUMATIC STEPPING MOTOR SYSTEM  
DUSTIN, M. O. GRIFFIN, W. S. WALLHAGEN, R. E.  
DATE- AUG. 1970 REAN- SEE ALSO NASA-TN-D-4495,  
NASA-TN-D-5155, NASA-TN-X-52250  
LEWIS-11051

Nutating stepping motor consists of an output rotating gear and a nutating gear. A flueric

logic circuit controls the nutating motor. The complete system constitutes a reliable, open loop actuator system with inherently high output stiffness, reasonable slewing speeds and small step size.

B70-10344

RADIOMETRIC EVALUATION OF ANTENNA-FEED COMPONENT LOSSES  
OTOSHI, T. Y. STELZRIED, C. T. DATE- AUG. 1970  
NPO-11238

Radiometric method accurately calibrates the principal line sections of an antenna, including the section which contains the antenna-feed component /mode generator and polarizer/. Precise knowledge of the absolute antenna temperature is not required.

B70-10346

ELECTRONICALLY CONTROLLED MOTOR DRIVE SYSTEM HAS ULTRA-HIGH RELIABILITY AND LONG LIFETIME  
VEILLETTE, L. J. DATE- SEP. 1970  
GSFC-10065

Direct drive electromechanical system is composed of brushless dc torque motor, offset-tooth magnetic sensor that derives position and rate information directly from output shaft, and rotary power transformer that transfers electrical power from external source to proper load. System has high servo loop stiffness and minimum power consumption.

B70-10355

DIGITAL PHASE-MODULATION/MULTIPLEX SYSTEM  
COUVILLON, L. A. DATE- SEP. 1970  
NPO-11338

System combines and modulates subcarriers and pulse code modulation data entirely with digital logic, and phase modulates an RF carrier with a digital representation of the composite subcarrier signal. It permits programmed control and modification of the modulation indices.

B70-10377

PICOSECOND PULSE MEASUREMENT BY TWO-PHOTON EXCITATION OF PHOTOGRAPHIC FILM  
BILLMAN, K. W. BURNHAM, D. C. DATE- SEP. 1970  
ERC-10227

Technique shoots two broad light beams onto a photosensitive surface which responds nonlinearly to the intensity in the beams. The resultant signal contains a component depending on the intensity correlation function between the two light beams.

B70-10421

ARTIFICIAL-FEEDBACK SYSTEM  
SUTTON, J. F. DATE- NOV. 1970  
GSFC-10324

System suppresses spurious sinusoidal responses of any sinusoidally driven amplifier showing time-dependent phase shift versus frequency function. System is applicable to any sinusoidally driven amplifier. Technique eliminates, or reduces, unwanted spurious vibrations during tests to determine dynamic frequency responses of mechanical systems.

B70-10422

IMPROVED MANUAL RADIO FREQUENCY DIRECTION FINDER  
GREENWOOD, T. L. DATE- SEP. 1970  
M-PS-20507

Antenna loop direction finder, consisting of two separate loops mounted rigidly together at right angles to each other, requires single rotation for operation. The loops, one for bearing, the other for sensing, are rotated manually. Sensing loop, in conjunction with nondirectional antenna, produces signal with directional pattern.

B70-10434

SUPPRESSION OF ZINC DENDRITES IN ZINC ELECTRODE POWER CELLS  
DANJANOVIC, A. /PA. UNIV./ DIGGLE, J. W. DATE- DEC. 1970  
HQ-10550

Addition of various tetraalkyl quarternary ammonium salts, to alkaline zincate electrolyte of

cell, prevents formation of zinc dendrites during charging of zinc electrode. Electrode capacity is not impaired and elimination of dendrites prolongs cell life.

B70-10435  
OPTIMAL ELECTRIC-DRIVE SYSTEM FOR VEHICLES  
SAHINKAYA, Y. E. DATE- OCT. 1970  
NPO-11210 NPO-11227

Pulse-width-modulated controller, for vehicle electrically driven by direct current from storage battery and requiring highest possible efficiency in battery use, varies electrical power through silicon controlled rectifiers for permanent magnet dc motors. System is not restricted to dc motors.

B70-10451  
WIDE-RANGE TRACKING OSCILLATOR GENERATES  
PHASE AND FREQUENCY COHERENT OUTPUT  
HOWARD, J. R. /BOEING CO./ DATE- SEP. 1970  
M-FS-14518

Tracking oscillator consists of modified phase-lock loop which controls voltage-controlled oscillator capable of automatic lock-on and track of periodic input waveform over frequency ratio 500-1. It is used in telemetry and communications systems where large signal fluctuations are encountered.

B70-10457  
PHASE INTERPOLATION CIRCUITS USING  
FREQUENCY MULTIPLICATION FOR PHASED ARRAYS  
CARON, P. R. MAILLOUX, R. S. DATE- OCT. 1970  
ERC-10285

Antenna phasing circuit is described with the following advantages - 1/ increased number of phased elements, 2/ current repetition for each array element, 3/ circuit simplicity, and 4/ accurate phase interpolation. This circuit functions with Huggins Scan or with nearly any other phasing system.

B70-10464  
COLOR TELEVISION SYSTEM USING SINGLE GUN  
COLOR CATHODE RAY TUBE  
GAISER, E. E. HILBORN, E. H. DATE- OCT. 1970  
ERC-10098

Two-primary color and single gun system provides quality differential color and variation in brightness for specific colors by varying current and controlling duty cycle of electron beam. Number of video amplifiers, deflection circuits, and guns required to display color TV picture is reduced and less complex tube is required.

B70-10478  
INDUCTION GENERATOR PRODUCES  
CONSTANT-FREQUENCY VOLTAGE FROM  
VARIABLE-SPEED DRIVE  
RIAZ, M. DATE- OCT. 1970  
ERC-10065

Two-stage polyphase generator is usable as induction motor operable over range of speeds while powered from constant frequency source. It requires neither slip rings nor special adjustable-frequency power supplies or external reactive sources.

B70-10479  
GROWING SINGLE CRYSTALS IN SILICA GEL  
RUBIN, B. DATE- SEP. 1970  
ERC-10306

Two types of chemical reactions for crystal growing are discussed. The first is a metathetical reaction to produce calcium tartrate tetrahydrate crystals, the second is a decomplexation reaction to produce cuprous chloride crystals.

B70-10480  
THERMAL TUNING OF ORGANIC DYE LASERS  
BILLMAN, K. W. BURNHAM, D. C. SCHAPPERT, G. T.  
DATE- DEC. 1970  
ERC-10187

Non-mechanical method for tuning liquid laser wavelengths involves electrically varying temperature of laser medium. Technique is used to investigate behavior of laser dyes, and may

lead to broad, tunable, light source for spectroscopy measurements of long path absorption.

B70-10481  
CONCEPT FOR A DISTRIBUTED PROCESSOR COMPUTER  
BOGUE, P. N. /N. AM. ROCKWELL CORP./ BURNETT, G.  
J. KOCZELA, L. J. DATE- DEC. 1970 REAN- SEE  
ALSO NASA-CR-1446, NASA-CR-1158  
ERC-10271

Future generation computer utilizes cell of single metal oxide semiconductor wafer containing general purpose processor section and small memory of approximately 512 words of 16 bits each. Cells are organized into groups and groups interconnected to form computer.

B70-10485  
ELECTRONIC SCANNING OF 2-CHANNEL MONOPULSE  
PATTERNS  
SCHMIDT, R. F. DATE- NOV. 1970 REAN- SEE ALSO  
NASA-TM-X-55580, NASA-TM-X-55938  
GSFC-10299

Scanning method involves separation of scanning capability into two independent degrees of freedom. One degree of freedom corresponds to azimuthal scanning and other to elevation scanning on spiral coordinate axes. Scanning of both prime-feed and mirrored patterns is accomplished with reduction of mechanical vibration damage to large antennas.

B70-10487  
QUICK CALCULATION METHOD FOR FLUID FLOW  
THROUGH DUCT SYSTEMS  
SCOTT, L. R., JR. /BOEING CO./ DATE- DEC. 1970  
M-FS-15069

Conditions for subsonic compressible flow through duct systems are quickly and easily calculated using compact series of curves showing dimensionless parametric functions of Mach number and specific heat ratio. Method is directly applicable to analysis and design of compressible flow systems in industrial fields or processes.

B70-10507  
LASER WAVELENGTH SELECTOR AND OUTPUT COUPLER  
HARD, T. M. DATE- DEC. 1970  
ERC-10248

Optical system eliminates displacement occurring when wavelengths are selected in multiple wavelength laser utilizing intracavity wavelength selection by first-order Littrow reflection of plane grating. Output coupling varies direction of output beam as different wavelengths are selected by grating rotation.

B70-10518  
DIGITAL DEMODULATION WITH DATA SUBCARRIER  
TRACKING  
SANGER, D. K. DATE- NOV. 1970 REAN- SEE ALSO  
NASA-CR-73514  
NPO-10858

Digital demodulator is based on early-late bit timing scheme coupled with Costas data tracking loop. System is successful in enhancement of weak signals from space where atmospheric and other interference media cause bit error rate to reach excessive level.

B70-10519  
A RADIOMETRIC METHOD FOR MEASURING THE  
INSERTION LOSS OF RADOME MATERIALS  
SEIDEL, B. L. STELZRIED, C. T. DATE- NOV. 1970  
NPO-11423

Radiometer system measures effective noise temperature directed towards sky, with and without radome over antenna horn. Data is then translated into computer format. With additional transmission line insertion loss data from other measurements, computer calculates insertion loss of radome material.

B70-10522  
FAIL-SAFE NUMERICAL CONTROL  
THOMPSON, G. A. /N. AM. ROCKWELL CORP./ DATE-  
NOV. 1970  
M-FS-12613

System provides duplicate set of control logic circuitry. Comparators insure that the same data

is present in both circuits. If any discrepancy is found, the machine is automatically stopped, before damage can occur.

## B70-10538

## LIGHTWEIGHT S-BAND HELIX ANTENNA

CRIBB, H. E. DATE- NOV. 1970

KSC-10392

Pyrotechnically operated S-band helical antenna is developed in which helix is deployed subsequent to antenna placement. Antenna is small, lightweight, and novel in that deployable helix is used in place of fixed dish or horn. It can be designed to cover L- and X-band frequencies.

## B70-10554

## DESIGN AND EVALUATION OF BRUSHLESS ELECTRICAL GENERATORS

COLLINS, F. A. /LEAR SIEGLER INC./ ELLIS, J. N.  
DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-54320,  
N65-29717, N65-30693, N65-30694, N65-30695,  
N65-30696

LEWIS-10124

Ten design manuals assembled and nine computer programs are developed for evaluation of proposed designs of brushless rotating electrical generators. Design manual package provides all information required for generator design, and computer programs permit calculation of performance of specific designs including effects of materials.

## B70-10572

## SPECTRAL ANALYSIS OF OSCILLATION INSTABILITIES IN FREQUENCY STANDARDS

LIPPINCOTT, S. /ADCOM RES. AND DEVELOP./ DATE- NOV. 1970

M-FS-20778

Phase and frequency fluctuations, inherent in oscillators used as frequency standards, are measured over spectral frequency range of 1 Hz to 5 kHz. Basic measurement system consists of electromechanical phase-locked loop that extracts phase and frequency fluctuations and error multiplier that extends threshold sensitivity.

## B70-10590

## DIGITAL-VOLTAGE CURVE GENERATOR

PERLMAN, M. DATE- NOV. 1970

NPO-11104

Curve generator capable of producing precisely repeatable curve for any single-valued function of voltage versus time uses digital approach, implemented by means of clocked feedback shift register, large scale integrated circuit diode matrix comprising about 12,000 diodes, counter, and digital-to-analog converter.

## B70-10616

## SYSTEM AUTOMATICALLY TUNES HYDROGEN MASERS

LEVINE, M. W. /HEWLETT-PACKARD CO./ VESSOT, R. F. C. DATE- NOV. 1970 REAN- SEE ALSO  
NASA-CR-94937

HQ-10502

Automatic tuning system permits frequency synchronization between two hydrogen masers. System matches spaceborne clock performance with that of ground-based clock to test red shift theory. This system, used in conjunction with radio astronomy for long-baseline interferometer experiments, serves as a tool for investigation of distant universe phenomena.

## B70-10617

## SWEEP-FREQUENCY UHF RADIOMETER FOR DEEP

## PROBES OF EARTH - A CONCEPT

KOPPL, W. /MARTIN MARIETTA CORP./ DATE- DEC. 1970

MSC-13428

Radiometer, developed for use on moon or planets, could be used to - determine layering and structure as deep as 100 feet below earth surface, determine physical properties of subsurface by variation of dielectric constants, identify types of materials including ore bodies and oil, and locate subsurface deposits of moisture.

## B70-10633

## A NEW SOLID-STATE LOGARITHMIC RADIOMETER

BURROUS, C. N. DEBOO, G. J. PAGE, W. A.  
WHITING, E. E. DATE- DEC. 1970

ARC-10287

Combination of temperature-compensated logarithmic amplifiers and p-i-n photodiodes operating in zero-bias mode provides lightweight radiometer for detecting spectral intensities encompassing more than three decades over a range of at least 300 to 800 nanometers at low power levels.

## B70-10638

## INTRUDER DETECTION SYSTEM

LEE, R. D. DATE- NOV. 1970

ARC-10097

Moving coil geophones are utilized to develop a small, rugged, battery operated system capable of detecting seismic disturbances caused by intruders. Seismic disturbances sensed by each geophone are converted into electrical signals, amplified, and transmitted to remote receiver which provides listener with aural signal.

## B70-10639

## INTEGRATOR FOR ON-LINE MEASUREMENT OF BUFFET SIGNALS

BATTS, C. N. DATE- DEC. 1970

LANGLEY-10627

Device determines average rms value of buffet signals by integrating rms signals from strain gages for preselected period of time. System measures average rms value of other transient data, and the upper frequency limit depends on the frequency response of the amplifiers.

## B70-10641

## TRAVELING-WAVE PHOTODETECTOR HAS

## SUB-NAANOSECOND RESPONSE

SUN, C. /RCA/ WALSH, T. E. DATE- DEC. 1970

GSFC-10831

Mercury-doped germanium photodetector uses waveguide which increases the absorption of microwave energy within the photodetectors. Waveguide and photodetector are placed in liquid helium Dewar and cooled. A carbon dioxide laser is light source and klystron provides microwave energy. Measured response times are approximately 1 nanosecond.

## B70-10662

## WATER VELOCITY METER

ROBERTS, C. W. SMITH, D. L. DATE- DEC. 1970

LANGLEY-10619

Simple, inexpensive drag sphere velocity meter with a zero to 6 ft/sec range measures steady-state flow. When combined with appropriate data acquisition system, it is suited to applications where large numbers of simultaneous measurements are needed for current mapping or velocity profile determination.

## B70-10664

## RC FILTER WITH LOW DISTRIBUTED CAPACITANCE

## PROVIDES 60 DB ISOLATION AT 500 MHZ

CESSNA, J. R. /IOWA UNIV./ DATE- DEC. 1970

GSFC-10983

Resistance-capacitance RC filter coupled to a high input impedance receiver preamplifier provides signal isolation from an RF transmitter. High isolation is achieved by minimizing the inductive impedance to ground and using the distributed capacitance of the filter components.

## B70-10691

## BRUSHLESS DIRECT-CURRENT MOTOR WITH

## STATIONARY ARMATURE AND FIELD

STUDER, P. DATE- DEC. 1970

XGS-05290

Electronically commutated dc motor has an active fixed field winding, and active fixed armature winding, and passive rotor. By use of brushless dc motor switching technique, motor provides continuous controllable and reversible torque without use of sliding contacts.

## B70-10716

## ELECTRONIC STRAIN-LEVEL COUNTER

PITTS, F. L. SPENCER, J. L. DATE- DEC. 1970

LANGLEY-10756

Counter for aircraft counts and records number of

times the strain at a point in a structural member exceeds each of four preset levels. Counter uses 28 volt dc power supply, metallic resistance strain gage bridge as sensor, integrated and solid state circuits for signal processing, and electromechanical counters for data storage and readout.

## B70-10718

DEVELOPMENT OF A SILVER-ZINC BATTERY SYSTEM  
MOSES, A. J. /HUGHES AIRCRAFT CO./ UCHIYAMA, A.  
A. DATE- DEC. 1970 REAN- SEE ALSO  
NASA-CR-108207  
NPO-11444

Summary report is described of historical documentation and detailed design data for development of silver-zinc battery for use on Surveyor spacecraft. Electrical and physical characteristics of battery models are included, along with data on qualification, acceptance, solar-thermal-vacuum, mission simulation testing, and actual flight performance.

## 03 PHYSICAL SCIENCES

## B70-10020

REINFORCEMENT OF POLYMERIC STRUCTURES WITH ASBESTOS FIBRILS  
RADER, C. A. /HARRIS RES. LABS., INC./ SCHWARTZ, A. M. DATE- JUN. 1970 REAN- SEE ALSO  
NASA-CR-893, NASA-CR-77225  
HQ-09954 HQ-09955

Investigation determines structural potential of asbestos fibrils. Methods are developed for dispersing macrofibers of the asbestos into colloidal-sized ultimate fibrils and incorporating these fibrils in matrices without causing reagglomeration.

## B70-10031

COLORIMETRIC DETECTION OF ETHYLENE GLYCOL VAPOR  
HELM, C. /INST. FOR RES./ MOSIER, B. VEROSTKO, C. E. DATE- FEB. 1970  
MSC-13222

Very low concentrations of ethylene glycol in air or other gases are detected by passing a sample through a glass tube with three partitioned compartments containing reagents which successively convert the ethylene glycol vapor into a colored compound.

## B70-10036

COMPACT APPARATUS FOR PHOTOGENERATION OF HYDRATED ELECTRONS  
HART, E. SCHMIDT, K. DATE- JUN. 1970  
ARG-10487

Flash-photolysis instrument generates hydrated electrons and studies their reactions. It has a three-dimensional, multiple-reaction cell and the capacity to produce up to .1 micromole hydrated electron in a single 40 microsec light pulse.

## B70-10055

IMMERSED ULTRASONIC INSPECTION OF HIGH ACOUSTICAL ATTENUATIVE STRUCTURES  
STUCKENBERG, F. H. /N. AM. ROCKWELL CORP./ DATE- MAY 1970  
MSC-15702

By building a floating isolator box of cork around the test object and using a low frequency transducer, automated conventional C scan equipment is adapted to inspect the object ultrasonically. Vibrations are isolated and reflected noise is reduced.

## B70-10061

HIGH-FIELD SUPERCONDUCTING NESTED COIL MAGNET  
LAVERICK, C. LOBELL, G. M. DATE- JAN. 1970 REAN- SEE ALSO ANL-7002  
ARG-10060

Superconducting magnet, employed in conjunction with five types of superconducting cables in a nested solenoid configuration, produces total, central magnetic field strengths approaching 70

kG. The multiple coils permit maximum information on cable characteristics to be gathered from one test.

## B70-10071

COST-REDUCING MULTIPURPOSE MICROFILM CARD  
SMITH, A. V. /BOEING CO./ DATE- JAN. 1970  
KSC-10508

Microfilm-aperture card is printed in the same format on both sides which enables the use of one card for mounting films that are \*\*right reading\*\* on both the base side and the emulsion side. This reduces the number of microfilm-card formats.

## B70-10085

A METHOD FOR RAPIDLY EVALUATING THE LINEARITY OF CALIBRATION DATA  
BARI, F. A. N. /BOEING CO./ DATE- JUL. 1970  
M-FS-14834

Simple technique determines whether or not a set of five data points lies within a specified close tolerance of a linear fit.

## B70-10099

ESTIMATING SENSITIVITY OF VACUUM GAGES  
SUMMERS, R. L. DATE- APR. 1970 REAN- SEE ALSO  
NASA-TN-D-5285  
LEWIS-11007

Gas sensitivity for a particular gas is estimated using the known performance of the gage with a reference gas /nitrogen/ and employing several empirical rules which have usable accuracy. Relative gage sensitivities have been estimated for over 100 gases and vapors.

## B70-10102

OPTIMIZING INSULATION WEIGHT ON CRYOGENIC STORAGE TANKS  
SAFAR, L. A. /BOEING CO./ DATE- SEP. 1970  
KSC-10399

Mathematical model uses boil-off rate, insulation density, tank surface area, performance level, and mission requirements to arrive at approximate insulation requirements for cryogenic storage tanks.

## B70-10106

WATER-FILLED HEAT PIPE USEFUL AT MODERATE TEMPERATURES  
MC KINNEY, B. G. DATE- SEP. 1970 REAN- SEE ALSO  
NASA-TM-X-53849  
M-FS-20543

Heat pipe is used in the primary heat exchanger for nuclear power plants, as a heat sink for high-power electronic devices, and in a closed-cycle heat rejection mechanism for cryogenic storage tanks. It serves simultaneously as a heat transfer device and as a structural member.

## B70-10108

FLUID MIXING TECHNIQUE INCREASES THE GAIN AND OUTPUT POWER OF CARBON DIOXIDE LASER SYSTEMS  
COOL, T. A. /CORNELL UNIV./ DATE- JUN. 1970  
HQ-10389

High speed flowing gas system provides uniform mixing in short times compared to flow transit times and carbon dioxide vibrational relaxation times. This system minimizes the effects of surrounding surfaces and provides a uniformly high gain that is independent of dimensions transverse to the flow direction.

## B70-10111

PASSIVE HEAT TRANSFER CONTROL  
FITZ, F. A. /SOUTHERN METHODIST UNIV./ DATE- JUL. 1970  
HQ-10041

Model maintains a preselected temperature in the near vicinity of a variable source of thermal energy. Heat input is controlled by a variable transformer and a voltage drop across the heater is used to calculate power dissipated.

## B70-10113

PHOTOIONIZATION MASS SPECTROMETER  
WARNECK, P. /GCA CORP./ DATE- FEB. 1970 REAN-

SEE ALSO NASA-CR-84871

HQ-10167

Photoionization source with a vacuum UV monochromator is used in ion reaction kinetics. Monochromator passes only the photon energies near the threshold of the selected ionization process. Absence of electron impact alleviates creation of different type ions that result in ion fragmentation.

B70-10122

CONTROL OF EQUILIBRIUM PRESSURE-TEMPERATURE CONDITIONS IN CRYOGENIC STORAGE

FORD, W. /N. AM. ROCKWELL CORP./ VOSS, J. DATE- JUN. 1970

M-FS-18115

Metered vent controls the pressure within a liquid hydrogen tank. Vent size is chosen to permit a gas flow which corresponds to the boil-off rate necessary to maintain the desired bulk temperature of the cryogen.

B70-10129

STRESS CORROSION CRACK INHIBITING

METHOD FOR TITANIUM

BECK, T. R. /BOEING CO./ DATE- SEP. 1970

NPO-10271

Addition of oxyanions to liquid solvents in excess of the number of chloride, bromide, or iodide ions present prevents cracking of titanium-aluminum alloys under exposure to aqueous and other solvent environments. The molar concentration of oxyanion is set from 10 to 100 times higher than concentration of halide ions.

B70-10130

ULTRA-HIGH MOLECULAR SINK VACUUM CHAMBER

STEPHENS, J. B. YAGER, S. P. DATE- JUN. 1970

NPO-10799

Double-wall vacuum chamber can be separated from the remainder of the system and pumped by ultra-clean techniques. Ultrahigh vacuum is maintained by the cryogenic effect of a cold wall and titanium chemisorption.

B70-10135

PROCEEDINGS OF THE THIRD SOUTHEASTERN

SEMINAR ON THERMAL SCIENCES

SPON- INNOVATOR NOT GIVEN /MARSHALL SPACE FLIGHT

CENTER/ DATE- NOV. 1970

M-FS-20627

Report contains papers discussing rheology, low temperature thermodynamics with emphasis on the helium system, aerodynamic heating, and thermophysics research at Marshall Space Flight Center. Abstracts of selected research and development programs covering entire spectrum of thermal sciences are included.

B70-10137

ULTRASONIC PROPAGATION IN GASES AT HIGH

TEMPERATURES

CAREY, C. /PANAMETRICS, INC./ CARNEVALE, E. H.

LYNNWORTH, L. C. UVA, S. DATE- SEP. 1970 REAN-

SEE ALSO AD-670192

HQ-10498

Ultrasonic pulse method /1 to 3 MHz/ measures both sound speed and absorption in monatomic and polyatomic gases in a temperature range of 300 to 20000 degrees K at atmospheric pressure. Helium, nitrogen, oxygen, and argon are investigated.

B70-10167

TEMPERATURE-CONTROLLED FLUIDIC DEVICE

A CONCEPT

REHSTEINER, P. H. /STANFORD UNIV./ DATE- NOV.

1970

HQ-10446

Symmetrical fluidic device directly converts electrical signals to mechanical signals in the form of a fluid-flow parameter. This device eliminates or reduces effects of all undesirable parameters on the departure angle, leaving it a function of the controlled wall and jet temperatures.

B70-10168

VAPOR FEEDING OF LIQUID METAL CATHODES

ECKHARDT, W. O. /HUGHES AIRCRAFT CO./ DATE- AUG.

1970 REAN- SEE ALSO NASA-CR-93771

HQ-10213

Modified liquid metal cathode apparatus permits vapor feeding in the diffuse-spot pattern mode. Vapor-fed cathode has advantages over liquid-fed systems.

B70-10173

IMPROVED CALIBRATION OF ACCELEROMETERS AT TEMPERATURES DOWN TO -450 DEGREES F

BUFFUM, R. D. /N. AM. ROCKWELL CORP./ DE CARLO,

T. A. PEEKINS, W. E. DATE- SEP. 1970

M-FS-18561

Improved technique calibrates piezoelectric accelerometers throughout temperature range from ambient to -450 degrees F. Method employs liquid helium as coolant, a cryogenic temperature chamber, a vibration measurement system, and a temperature measurement system.

B70-10187

NEW MICROWAVE SPECTROMETER/IMAGER HAS

POSSIBLE APPLICATIONS FOR POLLUTION

MONITORING

TOOLEY, R. D. /NORTHROP NORTRONICS/ DATE- OCT.

1970

NPO-10535

Microwave imager forms thermal-emissivity image of solid portion of planet Venus and provides data on the planet's atmosphere, surface, terminator, and temperature changes. These thermally produced multifrequency microwaves for image production of temperature profiles can be applied to water pollution monitoring, agriculture, and forestry survey.

B70-10197

CRYOGENIC THERMOCOUPLE CALIBRATION TABLES

HALL, W. J. /INST. FOR BASIC STANDARDS, NBS/

POWELL, R. L. SPARKS, L. L. DATE- APR. 1970

NUC-10551

Thermocouple calibration standards are developed for low-temperature thermocouple materials. Thermovoltage, thermopower, and the thermopower derivative are presented in tabular and graphical form.

B70-10209

TELEVISION CAMERA AS A SCIENTIFIC

INSTRUMENT

SMOKLER, M. I. DATE- JUL. 1970

NPO-11164

Rigorous calibration program, coupled with a sophisticated data-processing program that introduced compensation for system response to correct photometry, geometric linearity, and resolution, converted a television camera to a quantitative measuring instrument. The output data are in the forms of both numeric printout records and photographs.

B70-10221

COERCIVE FORCE OF THIN MAGNETIC FILMS

BALDWIN, J. A. DATE- SEP. 1970

NPO-10750

Phenomenological model aids in understanding the mechanisms responsible for the easy-axis coercive force in thin magnetic films of NiFe, MnBi, and gadolinium iron garnet.

B70-10223

USE OF THERMODYNAMIC PROPERTIES OF

METAL-GAS SYSTEMS AS LOW-PRESSURE STANDARDS

LUNDIN, C. E. /DENVER RES. INST./ DATE- AUG.

1970 REAN- SEE ALSO NASA-CR-1271  
LANGLEY-10452

Modified version of Sievert's apparatus accurately calibrates low pressure measuring instruments. Metal-gas system is composed of hydrogen in two-phase equilibrium with erbium to obtain reproducible hydrogen pressures.

B70-10226  
DIFFUSION FILTER ELIMINATES FRINGE EFFECTS  
OF COHERENT LASER LIGHT SOURCE  
OLSASKY, M. J. /N. AM. ROCKWELL CORP./ DATE-  
SEP. 1970  
NPO-10417

Diffusion filter comprised of small particles in colloidal suspension reduces the coherence of a laser beam used as a photographic light source. Interference patterns which obscure details in photographic film are eliminated, the intensity and collimation are moderately affected.

B70-10231  
COMBINING MICRO DRY COLUMN CHROMATOGRAPHY  
AND MASS SPECTROMETRY  
BAUMAN, A. J. DATE- NOV. 1970  
NPO-11240

Dry column chromatography principles applied in microscale produce technique to minimize time in preparing and analyzing colorless constituents of soluble mixtures. Glass pipette microcolumns filled with finely sieved adsorbents permit capillary attraction and separation in 3 to 15 minutes. Technique is adaptable to gas chromatography.

B70-10240  
NEUTRON-IMAGE INTENSIFIER  
BERGER, H. DATE- APR. 1970  
ARG-10249

Electronic intensifier tube with a demagnification ratio of 9-1 enhances the usefulness of neutron-radiographic techniques. A television signal can be obtained by optical coupling of a small-output phosphor-light image to a television camera.

B70-10256  
SHORT-DURATION, TRANSONIC FLOW,  
VARIABLE-POROSITY TEST SECTION  
DAVIS, J. W. HILL, O. E. DATE- SEP. 1970 REAN-  
SEE ALSO NASA-TN-X-53571  
M-FS-20509

Short-duration test facility obtains extremely high Reynolds number flows in subsonic, transonic, and supersonic speed ranges, and aids in solving Reynolds number-dependent aerodynamic and thermodynamic problems in design and testing of large, high speed vehicles. The modified blowdown wind tunnel avoids data confusion and aerodynamic noise.

B70-10260  
METHODS FOR MEASURING THE LOUDNESS AND  
NOISINESS OF COMPLEX SOUNDS  
KRYTER, K. /BOLT, BERANEK, AND NEWMAN, INC./  
DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-422  
HQ-10332

Physical and temporal aspects of sound which influence the rating of subjective noisiness are intensity, spectrum shape and bandwidth, spectral complexity, and duration. Objective rating methods include a graphic method, full octave and one-third octave methods, and methods that measure one value over all frequencies.

B70-10268  
THE EFFECT OF OBJECT MOTION IN FRAUNHOFER  
HOLOGRAPHY WITH APPLICATION TO VELOCITY  
MEASUREMENTS  
DOTSON, W. P., JR. DATE- SEP. 1970 REAN- SEE  
ALSO NASA-TN-D-5515  
MSC-12295

Experimental results extend the Fraunhofer holography theory to include moving objects. Conclusions indicate objects may move up to ten times their mean diameter during observation time. Their motion produces fringe patterns descriptive of that motion from which it is possible to reconstruct the hologram and measure the velocity.

B70-10269  
MAGNESIUM OXIDE DOPING REDUCES ACOUSTIC  
WAVE ATTENUATION IN LITHIUM METATANTALATE  
AND LITHIUM METANIOPATE CRYSTALS  
CROFT, W. /SPERRY RAND RES. CENTER/ DAMON, R.  
KEDZIE, R. KESTIGIAN, M. SMITH, A. WORLEY, J.  
DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-86145  
ERC-10463

Single crystals of lithium metatantalate and lithium metaniopate, grown from melts having different stoichiometries and different amounts of magnesium oxide, show that doping lowers temperature-independent portion of attenuation of acoustic waves. Doped crystals possess optical properties well suited for electro-optical and photoelastic applications.

B70-10270  
MANUALLY OPERATED ELASTOMER HEAT PUMP  
HUTCHINSON, W. D. DATE- JUL. 1970  
NPO-10677

Device consisting of a rotating mechanism, a frame with multiple wide bands of rubber, and a fluid bath, demonstrates the feasibility of a human operated device capable of cooling or producing heat. This invention utilizes the basic thermodynamic properties of natural rubber.

B70-10271  
FINITE FRINGE HOLOGRAM  
HEFLINGER, L. O. /TRW SYSTEMS GROUP/ DATE- MAY  
1970  
HQ-10347

In holographic interferometry a small movement of apparatus between exposures causes the background of the reconstructed scene to be covered with interference fringes approximately parallel to each other. The three-dimensional quality of the holographic image is allowable since a mathematical model will give the location of the fringes.

B70-10272  
THE EFFECTS OF NUCLEAR POWER GENERATORS  
UPON ELECTRONIC INSTRUMENTATION  
MILLER, C. G. TRUSCELLO, V. C. DATE- SEP. 1970  
NPO-11217

Radiation sensitivity of electronic instruments susceptible to neutron and gamma radiation is evaluated by means of a radioisotope thermoelectric generator /RTG/. The gamma field of the RTG affects instrument operation and requires shielding, the neutron field does not affect operation via secondary capture-gamma production.

B70-10280  
THERMALLY CASCADED THERMOELECTRIC GENERATOR  
FLAHERTY, R. /WESTINGHOUSE ELEC. CORP./ DATE-  
MAY 1970  
NPO-10753

High efficiency thermoelectric generator utilizes a high-temperature thermoelectric material in thermal series with a low-temperature material. A thermally cascaded generator increases system efficiency.

B70-10292  
NONCONTACTING-OPTICAL-STRAIN DEVICE  
SILVER, R. H. DATE- AUG. 1970  
NPO-10778

Noncontacting-strain-measuring gauge and extensometer remotely measures the mechanical displacement along the entire length of a test specimen. Measurement is accomplished by continuous scanning of a reflected light from reflective bench markings or stripes previously affixed to the specimen.

B70-10296  
INEXPENSIVE NET SOLAR FLUX RADIOMETER  
DARKOW, G. L. /MO. UNIV./ DATE- AUG. 1970  
HQ-10087

Radiometer measures the absorption and reflection of solar radiation by opaque and translucent surfaces. Surface-coating modifications permit measurements over selected broad wavelength bands within the solar spectrum.

**B70-10299**  
**THERMALLY INDUCED OSCILLATIONS IN FLUID FLOW**

ZUBER, N. /GE/ DATE- JUN. 1970 REAN- SEE ALSO  
 NASA-CR-84801  
 M-FS-20449

Theoretical investigation distinguishes the various mechanisms responsible for oscillations of pressure, temperature, and flow velocity, derives a quantitative description of the most troublesome mechanisms, and develops a capability to predict the occurrence of unstable flow.

**B70-10311**  
**COMPUTERIZED POLAR PLOTS BY A CATHODE RAY TUBE/GRID OVERLAY METHOD**

FREEMAN, J. M. /BOEING CO./ SHoup, E. L. DATE- JUN. 1970  
 M-FS-14464

Overlay is aligned with four calibration dots so it is not affected by CRT drift or changes in vertical or horizontal gain when producing Nyquist /frequency-response phase/amplitude/ plots. Method produces over 50 plots per hour.

**B70-10315**  
**CHEBYSHEV MINIMAX CONTROL THEORY**

JOHNSON, C. D. /GEN. DYN./CONVAIR/ DATE- JUN. 1970  
 M-FS-20639

General, closed-form, analytical solutions are determined for certain classes of C-minimax control problems, several alternative mathematical theories are derived, and a controller design theory is developed to give optimal control in the presence of unmeasurable external disturbances.

**B70-10318**  
**IMPROVED HEAT SHIELD/RADIATOR**  
 SMITH, J. W. DATE- SEP. 1970  
 NPO-11105

Thermally conductive metal shield is put in direct thermal contact with the mounting plate for the radiation detectors. External surfaces of the shield are insulated by an insulation blanket. The internal faces are covered with a thin layer of quartz with a metallic thermally conductive coating on the hidden faces.

**B70-10319**  
**STELLAR SPECTRUM CLASSIFIER**

REID, J. H. /LOCKHEED ELECTRON. CO./ DATE- JUN. 1970  
 MSC-13450

Stellar classification is accomplished by correlating holograms of classified spectra with the Fourier transform of the spectral images to be classified.

**B70-10321**  
**DIRECTIONAL CONTROL OF RADIANT HEAT**

HOWELL, J. R. PERLMUTTER, M. DATE- JUL. 1970  
 LEWIS-90237

Surface with grooves having flat bases gives directional emissivities and absorptivities that can be made to approximate a perfect directional surface. Radiant energy can then be transferred in desired directions.

**B70-10324**  
**RADIANT HEATING CONCEPT EFFICIENT FOR LIGHT-TRANSMITTING WINDOWS**

NEUMAN, J. R. /MARTIN MARIETTA CORP./ NOVORYTA, R. J. DATE- OCT. 1970  
 M-FS-20630

Single-pane, uncoated windows absorb infrared rays and transmit visible and near-visible wavelengths. Two opposed rod heaters direct infrared rays at the pane, reflectors aid in this heating which prevents condensation. These windows are useful for telescopes and cameras for oceanographic and related studies.

**B70-10325**  
**VARIABLES IN TURBINE EROSION**

BAUGHMAN, J. R. /N. AM. ROCKWELL CORP./ SPIES, R. DATE- SEP. 1970  
 M-FS-18677

Study of impact erosion in the operation of

turbomachinery is undertaken to predict the results for particular designs. The test program investigates the effects of turbine stator blade shape, rotor blade shape, and variations in test conditions.

**B70-10341**  
**NONLINEAR DAMPING IN STRUCTURES**

CHANG, C. S. /LOCKHEED CORP./ DATE- SEP. 1970  
 M-FS-20701

Experimental results prove the feasibility of substructure testing to measure local damping properties directly. Dynamic responses of a structure can be predicted quantitatively, and specimens are less costly and more easily tested with better controlled tests and environments.

**B70-10354**  
**IMPROVED OPTICAL LENS SYSTEM**

SCHMIDT, L. F. DATE- SEP. 1970  
 NPO-11311

Objective lens produces a backwardly curving image of a star field that matches the similarly curved surface of the photocathode of an image dissector tube. Lens eliminates the need for a fiber-optics translation between the flat plane image and curved photocathode.

**B70-10356**  
**CALORIMETER MEASURES HIGH NUCLEAR HEATING RATES AND THEIR GRADIENTS ACROSS A REACTOR TEST HOLE**

BURWELL, D. /WESTINGHOUSE ASTRONUCL. LAB./, COMBE, J. R. MC BRIDE, J. /IDAHO NUCL. CORP./ DATE- OCT. 1970  
 NUC-10227

Pedestal-type calorimeter measures gamma-ray heating rates from 0.5 to 7.0 watts per gram of aluminum. Nuclear heating rate is a function of cylinder temperature change, measured by four chromel-alumel thermocouples attached to the calorimeter, and known thermoconductivity of the tested material.

**B70-10357**  
**DATA FROM VARIOUS SOURCES PROVIDE STANDARD SINGLE-LEVEL RESONANCE PARAMETERS FOR URANIUM 233**

SCHNEIDER, M. J. /WESTINGHOUSE ASTRONUCL. LAB./ DATE- SEP. 1970  
 NUC-10229

Method of calculating Breit-Wigner resonance parameters for uranium 233 allows for different sources of data. Parameters for 63 resonances in the neutron-energy range 0 to 62 eV are yielded by simultaneous fit to three sets of data.

**B70-10360**  
**MULTISPECTRAL FACSIMILE REPRODUCER**

BURCHER, E. E. HUCK, F. O. DATE- OCT. 1970  
 LANGLEY-10618

Facsimile reproducer records spatially well-registered true-color and false-color video data on tape. Proposed optical arrangement allows light sources to be adjusted along the mirror scanning direction in such a manner that no electronic delays are required if the reproducer is operated synchronously with the camera.

**B70-10371**  
**HOLOGRAPHIC PHOTOGRAPHY OF HIGH VELOCITY PARTICLES**

DYES, W. A. /TECH. OPERATIONS, INC./ MC CABE, B. J. WARD, J. H. DATE- SEP. 1970 REAN- SEE ALSO  
 NASA-CR-86147

Fourier transform hologram camera increases the velocity range for holography by a factor of 10 to 1000. Two different optical systems, using a triangular arrangement of beam splitters and a mirror to illuminate the object from two directions, are investigated.

**B70-10379**  
**HIGH TEMPERATURE ION SOURCE**

SWIFT, R. /AM. SCI. AND ENG., INC./ DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-86022  
 ERC-10197

Modified Nielsen-type ion source produces

temperatures up to 1500 degrees C and permits obtaining a plasma from low vapor-pressure materials. Design minimizes thermal stresses. Dual-filament discharge chamber achieves the high temperature and provides independent control of the heating and electron emission functions.

**B70-10381**  
DIRECTIONAL COUPLER FOR OPTICAL WAVEGUIDES

SCHINELLER, E. R. /WHEELER LABS., INC./ WILMOT, D. W. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-332  
ERC-10094

Feasibility study of transmitting optical energy in single mode through photonic waveguides results in a conceptual directional coupler consisting of two types of optical waveguides /a stratified /core/ dielectric and a mirror wall/. Waveguide medium analysis produced formulation of mode cutoff conditions, field distributions, and propagation characteristics.

**B70-10405**  
INTERFEROMETER FOR MEASUREMENT OF OPTICAL POLARIZATION  
ABHYANKAR, K. FYMAT, A. DATE- NOV. 1970  
NPO-11239

Standard two-beam interferometer with polarizers in each beam and an analyzer at the recombined focal point provides greater accuracy and higher resolution than any other known method for measuring variation of polarization within a spectral line and in the surrounding continuum.

**B70-10413**  
IMPROVED LININGS FOR INTEGRATING SPHERES  
FERGERSON, P. O. FRENCH, B. O. DATE- OCT. 1970  
MSC-12237

Sphere surface is covered with plain weave of glass fibers coated with polytetrafluoroethylene and one or two layers of magnesium oxide vapor. The resultant lining is suitable for measurement of radiation in the ultraviolet, visible, and near-infrared wavelengths, is not damage prone, and is easily cleaned.

**B70-10415**  
EVALUATION OF TWO DESIGNS FOR CRYOGENIC INSULATION  
GETTY, R. C. /GEN. DYN./ DATE- SEP. 1970  
M-FS-14740

Shingle-type, crinkled, aluminized polyethylene ester is thermally and structurally tested for cryogenic insulation. Insulation systems require thermal efficiency with minimum weight, and the ability to withstand vibration, acceleration, and rapid pressure drops.

**B70-10426**  
MULTIPASS HOLOGRAPHIC INTERFEROMETER IMPROVES IMAGE RESOLUTION  
BROOKS, R. E. /TRW SYSTEMS GROUP/ HEPLINGER, L. O. DATE- NOV. 1970  
HQ-10499

Multipass holographic interferometer forms a hologram of high diffraction efficiency, and hence provides a bright and high contrast interferogram. It is used to study any effect which changes the index of refraction and to study surface deformations of a flat reflecting surface.

**B70-10438**  
AIRBORNE SPECTROMETER SENSES SEVERAL GASES  
MC DOWALL, J. /BARRINGER RES., LTD./ MOFFAT, A. J. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-99609  
MSC-12234

Spectrometer's variable shutter permits observation of a wide range of plume widths. Adjustable grating, counter, and access window enable operator to reset grating's position during flight by resetting the counter to a predetermined number. Quartz correlation mask and spectral-aperture instrument-function filter are mounted in a replaceable precision frame.

**B70-10439**  
LASER METHOD FOR FINDING AXIS OF ROTATION  
MASSEY, G. A. /SYLVANIA ELECTRON. SYSTEMS/ DATE-

DEC. 1970 REAN- SEE ALSO NASA-CR-985  
ARC-10388

Illumination of rotating surface with laser beam and examination of interference patterns resulting from diffused reflections determines position of axis and direction of motion. Interference patterns are viewed through a lens or recorded on film as circular streaking patterns.

**B70-10441**  
HYDROGEN MASER - MEASUREMENT OF WALL SHIFT WITH A FLEXIBLE BULB  
BRENNER, D. /HARVARD UNIV./ DATE- NOV. 1970  
HQ-10552

Flexible bulb is squeezed to change mean free path of hydrogen atoms, and to change bulb's volume without changing its surface area. Volumes in the different configurations are measured to learn the change in mean free path and calculate wall shift. Various bulb coating materials are described.

**B70-10442**  
DERIVATION OF A GENERAL PERTURBATION SOLUTION - ITS APPLICATION TO DETERMINATION OF ORBIT  
BORN, G. H. /TEX. UNIV./ DATE- DEC. 1970  
MSC-13377

Analytical solution to three-body problems is applied to the problem of predicting the orbit of a lunar satellite and determining the orbit of a near-earth satellite. Using this solution, the state vector may be generated at any time without intermediate numerical extrapolation.

**B70-10445**  
ALUMINUM-SILICON EUTECTIC ALLOY IMPROVES ELECTRICAL AND MECHANICAL CONTACT TO SILICON CARBIDE  
SHIER, J. S. DATE- NOV. 1970  
ERC-10277

Alloy contact layer is made at relatively low temperature and has good wetting characteristics. Contacts adhere well to silicon carbide surface, penetrating about 300 to 500 angstroms into it. Contacts are ohmic on p-type silicon carbide and blocking on n-type.

**B70-10461**  
VERY LOW VELOCITY FLOW SENSOR USES FLUIDIC TECHNIQUES  
TUREK, R. F. /BOWLES ENG. CORP./ DATE- NOV. 1970  
REAN- SEE ALSO NASA-CR-86352  
ERC-10404

Parallel-flow wind sensor provides differential pressure output which is nearly linear and relatively insensitive to supply pressure over a wide range of wind velocities. Cross-flow wind sensor outputs are input to a fluidic amplifier to obtain high pressure output for low wind velocities without changing output characteristics.

**B70-10471**  
APPARATUS FOR SIMULTANEOUS ION COUNTING AND CURRENT RECORDING IN MASS SPECTROMETRY  
KOHLE, F. J. ROBERTS, W. K. STEARNS, C. A. DATE- SEP. 1970  
LEWIS-11103

Ion counting system is coupled to the last dynode of an Allen-type electron multiplier on the mass analyzer of a double focusing mass spectrometer. This leaves the anode available for an electrometer, making possible simultaneous measurements. Coupling is achieved by a ferrite core transformer and associated circuitry.

**B70-10472**  
AMBIENT-LIGHT-ABSORBING SCREEN FOR FRONT PROJECTION  
HILBORN, E. H. DATE- NOV. 1970  
ERC-90017

Screen permits front surface projection of collimated light beam under conditions of high extraneous illumination. Screen has high reflective efficiency over any desired viewing area. Its optical properties are maintained when moisture droplets are present on the external front planar surface. Surface is easily cleaned



and maintained.

B70-10473  
GROWTH OF SINGLE-CRYSTAL GALLIUM NITRIDE  
CLOUGH, R. /RCA/ RICHMAN, D. TIETJEN, J. DATE-  
OCT. 1970 REAN- SEE ALSO NASA-CR-86192,  
NASA-CR-110194  
ERC-10301

Use of ultrahigh purity ammonia prevents oxygen contamination of GaN during growth, making it possible to grow the GaN at temperatures as high as 825 degrees C, at which point single crystal wafers are deposited on /0001/-oriented sapphire surfaces.

B70-10491  
KINETIC INDUCTANCE MEASURED IN A  
SUPERCONDUCTING WIRE  
MESERVEY, R. H. /MIT/ TEDROW, P. M. DATE- NOV.  
1970 REAN- SEE ALSO N69-33783  
ERC-10305

Ultrasensitive technique to measure kinetic inductance has test specimen included as part of the inductance of a tank circuit of a tunnel diode oscillator. Frequency counter measures shift in frequency of oscillator, caused by changes in inductance. Frequency shift in tank circuit is proportional to change in kinetic inductance

B70-10493  
VACUUM LEAK DETECTOR FEATURES HIGHER  
SENSITIVITY  
BARRINGTON, A. E. DATE- NOV. 1970 REAN- SEE ALSO  
NASA-CR-86243  
ERC-10034

Technique for measuring partial pressures utilizes extremely large resonance scattering cross section of xenon at 1471 angstroms to scatter light in a vacuum cell. Output signal of ultraviolet-sensitive photodetector is proportional to the partial pressure and to the rate of inleakage of xenon probe gas.

B70-10510  
PLASMA CONDUCTIVITY GAGE  
GILL, S. P. /STANFORD RES. INST./ DATE- NOV.  
1970  
ARC-10147

Gage permits determination of stagnation conductivity from measurement of shunt impedance presented by the plasma between the inner and outer conductors of a segment of coaxial transmission line. Response of gage permits its use in shock-tube work and research on explosive propagation.

B70-10536  
OVERLAPPED CONIC SIMULATION OF THREE-BODY  
TRAJECTORIES  
WILSON, S. W., JR. /TRW SYSTEMS GROUP/ DATE-  
NOV. 1970 REAN- SEE ALSO NASA-CR-101862  
MSC-13460

Trajectory computation technique for three-body motion is based on analytical derivation and empirical validation of pseudostate theory. Application of technique yields \*\*overlapped conic\*\* trajectories with error magnitudes only 20 percent as great as those of patched conic trajectories.

B70-10539  
THE DETERMINATION OF STABILITY DOMAINS FOR  
NONLINEAR DYNAMICAL SYSTEMS  
ABBATE, J. V. /GRUMMAN AIRCRAFT ENG. CORP./  
GEISS, G. R. DATE- SEP. 1970 REAN- SEE ALSO  
NASA-CR-84042  
M-FS-14832

Research effort is described which is directed toward several aspects of the stability problem pertinent to the analysis of space vehicle guidance systems. Problems encountered during this study are mentioned.

B70-10549  
MINIATURE SPRAY-PAINTING BOOTH  
FEE, K. W. /N. AM. ROCKWELL CORP./ DATE- NOV.  
1970  
MSC-15811

Transparent spray booth provides method for

quality painting and repair of surfaces in clean room or other specialized environments. Overspray and virtually all contaminating vapor and odor can be eliminated. Touch-up painting is achieved with spray gun.

B70-10563  
NOVEL WAVE GENERATOR ADAPTABLE TO INDOOR  
SURFBOARDING  
HEIDMANN, M. F. PHILLIPS, B. R. DATE- DEC. 1970  
REAN- SEE ALSO NASA-TN-D-4380  
LEWIS-11096

Method is devised for generating strong acoustic waves in confined body of water. Strong travelling acoustic waves or modes are created by rotation of radial jet of gas at center of short cylindrical chamber. Method and wave structure suggest novel facility for water sports.

B70-10564  
HIGH-TEMPERATURE RAPID-RESPONSE THERMOCOUPLE  
FOR REDUCING ATMOSPHERES  
GRACEY, C. M. /AEROJET-GEN. CORP./ HOFF, R. G.  
DATE- NOV. 1970  
NUC-10530

Thermocouple measures continuously in flowing gaseous hydrogen at temperatures up to 4000 deg F, in environments made hazardous by radiation, and where rapid response and calibration reproducibility are critically important. Thermocouple wires extend continuously, without splice or foreign material, from cold junction to probe\*s tip.

B70-10575  
A SIMPLIFIED METHOD FOR DETERMINING  
CONVECTIVE HEAT-TRANSFER COEFFICIENTS  
HUFF, R. G. DATE- OCT. 1970 REAN- SEE ALSO  
NASA-TN-D-5520, NASA-TN-X-1980  
LEWIS-11156

Convective heat transfer coefficients are determined by measuring temperatures of hot and cold fluids separated by wall, and temperature of wall at single point. Method is applicable to heat exchangers and rocket engines.

B70-10581  
MULTIPLE FOCUSING MAGNETS USED FOR VELOCITY  
SELECTION OF ATOMS  
SPON- INNOVATOR NOT GIVEN /HEWLETT-PACKARD CO./  
DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-89275,  
B67-10146  
GSFC-10128

Computer techniques are used in calculating velocity selection of hydrogen atoms for use in maser frequency standard. Technique permits designer to resolve design problems of multiple focusing magnets employed in atomic velocity selection. There is excellent agreement with hand calculations in constant magnetic moment approximation.

B70-10591  
THE WATER-CRYOGEN HEAT EXCHANGER  
BARTLIT, J. R. /LOS ALAMOS SCI. LAB./ BOYER, K.  
WILLIAMSON, K. D. DATE- OCT. 1970  
NUC-11029

Heat exchanger, using water as heat medium, converts liquid hydrogen to gaseous hydrogen at a very high rate. Possible applications include treatment of liquified natural gas in cities to bring the gas on-line quickly, conversion of liquid oxygen and liquid nitrogen for steel mills, and high volume inert purging.

B70-10592  
THE LOW-COST CRYOSTAT  
BRONSON, J. C. /LOS ALAMOS SCI. LAB./ DATE- OCT.  
1970  
NUC-11034

Inexpensive method of fabricating cryostats uses polyurethane, super insulation, fiber glass, and cardboard/plywood. Cryostat weighs 1/10 of Dewar, occupies about same volume, is easy to handle, requires no metal parts, and can be formed into virtually any configuration.

B70-10593  
FROST AS AN INSULATOR

BRONSON, J. C. /LOS ALAMOS SCI. LAB./ DATE- OCT. 1970

NUC-11039

Insulating qualities of frost and mechanisms for using frost in specific applications in controlled experiments are discussed. With available supply of moist air, frost possesses inherent advantage of easy insulation of cryogenic lines and improvement of overall system efficiency.

B70-10596

HIGH-STRENGTH MAGNETIC MATERIALS

DETERT, K. /WESTINGHOUSE ELEC. CORP./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-1460

LEWIS-10697

Two new precipitation-hardened magnetic alloys are suitable for operation in 800 to 1600 deg F range. One is a martensitic alloy and the other a cobalt-based alloy. They possess improved creep resistance and have application in high temperature inductors and alternators.

B70-10608

EVALUATION OF DECAY CURVES OF A CHEMICAL SPECIES UNDERGOING SIMULTANEOUS FIRST- AND SECOND-ORDER DECAY

SCHMIDT, K. H. DATE- DEC. 1970 REAN- SEE ALSO ANL-7400

ARG-10281

IBM 1620 computer prepares tables to enable fast calculation of the first- and second-order rate constants from two half-lives and the corresponding initial concentrations, obtained from either one or two decay curves.

B70-10611

AN IMPROVED ORBITRON IONIZATION GAGE

MEASURES ULTRAHIGH VACUUM

GOSSELIN, C. M. /MIDWEST RES. INST./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-1300

LANGLEY-10535

Ionization gage with improved signal-to-noise ratio has a helical coil electrode which separates the solid cathode ion collector from the volume where ionization of gas molecules takes place. Helical coil increases lifetime of electrons and reduces secondary emission from the collector.

B70-10620

QUADRUPOLE IONIZATION GAGE MEASURES

ULTRAHIGH VACUUM

SCHWARZ, H. J. /RENSSELAER POLYTECH. INST./

DATE- DEC. 1970

LANGLEY-10397

Quadrupole system, energized with a 200 MHz electric field, restrains ionizing electrons within the center of the ionization gage. Oscillatory trajectory of the electrons increases the probability of ionizing the gas molecules, lowers background X-ray level, and increases the signal-to-noise ratio.

B70-10622

RUGGED, LOW-CONDUCTANCE, HEAT-FLOW PROBE

BOUDREAU, E. J. /LITTLE /ARTHUR D./, INC./

HINCKLEY, R. B. LUCAS, R. M. MC CULLOUGH, J. E.

DATE- DEC. 1970

MSC-13443

Lightweight, compact probe structure has low thermal conductance to enable accurate measurement of slight temperature gradients. Probe combines ruggedness, high precision, accuracy, and stability. Device can withstand vibration, shock, acceleration, temperature extremes, and high vacuums, and should interest industrial engineers and geologists.

B70-10628

ACCURATE, RAPID, TEMPERATURE AND

LIQUID-LEVEL SENSOR FOR CRYOGENIC TANKS

DE WITT, R. L. STOCHL, R. J. TERBEEK, H. G.

DATE- NOV. 1970 REAN- SEE ALSO NASA-TN-D-4339

LEWIS-11208

Thermopiles measure ullage gas temperatures to within plus or minus 1.65 deg K between 20 and 300 deg K, and also serve as point liquid-level sensors. Thermopile technique measures smaller temperature differences by keeping the reference junctions inside the tank and near the temperature

range of the measuring junction.

B70-10631

LASER BEAM HYDROCARBON DETECTOR

BEAM, B. H. BURROUS, C. N. JAYNES, D. N. DATE- NOV. 1970

ARC-10156

Portable instrument passes light from helium-neon laser at a wavelength of 3.39 microns through the atmosphere being monitored and measures attenuation of the laser beam. Since beam attenuation is due almost exclusively to absorption of radiation by hydrocarbons, a quantitative measure of their concentration is available.

B70-10632

TOROIDAL MIRRORS PROVIDE VIRTUAL WALLS FOR BREAKS IN LIGHT PIPES

YOUNG, N. /BLOCK ENG., INC./ DATE- NOV. 1970

ARC-10031

Section of light pipe consists of separated segments having opposed toroidal mirrors that intercept meridional rays to present virtual wall in space between mirrors, thus insuring uninterrupted light transmission down the pipe. Design affords internal access to pipe section. Segments are electrically or thermally insulated from one another.

B70-10646

LIGHTWEIGHT, SELF-EVACUATED INSULATION PANELS

DENGLER, R. P. NIENDORF, L. /UNION CARBIDE CORP./ NIES, G. PERKINS, P. J., JR. DATE- DEC. 1970 REAN- SEE ALSO NASA-TN-D-4375

LEWIS-90361

Multilayer insulation of prefabricated panels is developed for cryogenic storage tanks. System utilizes panels of aluminized Mylar separated by sheets of low conductivity polyurethane foam. Panels are self-evacuated by cryopumping of gaseous carbon dioxide at time of use.

B70-10649

PROCEEDINGS OF THE SYMPOSIUM ON LONG-LIFE

HARDWARE FOR SPACE

SPON- INNOVATOR NOT GIVEN /MARSHALL SPACE FLIGHT CENTER/ DATE- DEC. 1970

M-FS-20638

Two-volume edition of the papers of the symposium is described. It is divided into six sections - parts, materials, management, system testing, component design, and system test. Material presented focuses attention on problems created by the increased complexity of technology and long-term mission requirements.

B70-10656

ORBIT, REENTRY, AND LANDING ATTACHMENT FOR

GLOBES

PRITCHARD, E. B. DATE- DEC. 1970

LANGLEY-10626

Navigation device, invented to aid recovery of spacecraft from any orbit, also illustrates motions of satellites relative to earth and their entry-ranging requirements. Device rapidly and accurately defines lateral range requirements for spacecraft returning to any desired site without manual or computerized calculation of orbital equations of motion.

B70-10658

DUAL-WAVELENGTH SYSTEM MONITORS DEPOSITION

OF FILMS - A CONCEPT

ZURASKY, J. L. DATE- DEC. 1970

M-FS-20675

System monitors fabrication of high-quality optical filters and other precise film deposition operations. System generates output signal of an element that changes rapidly when deposition process changes or stops, and eliminates defects of single-wavelength systems. Five additional advantages of dual-wavelength system are listed.

B70-10659

OPTICAL CONTAMINATION DURING THERMAL TESTING

IN VACUUM

ZWIENER, J. M. DATE- DEC. 1970

M-FS-20736

Comparative tests are described for optical degradation in vacuum systems served by oil-type or ion-type pumping operation. Results show that degradation occurs only during ultraviolet irradiation in vacuum systems with oil-type pumping systems and that it increases with exposure time. Degradation does not occur with ion systems.

B70-10665

## OPTICAL PROBING OF SUPERSONIC AERODYNAMIC TURBULENCE

CIKANER, H. A., JR. FUNK, B. H. DATE- DEC. 1970  
 REAN- SEE ALSO N69-38125

M-FS-20686

Laser quasi-schlieren system and laser shadow-correlation system retrieve flow-related signals sufficient for computing accurate, reproducible correlation peaks. Statistical method for obtaining one-shot measurements of the decay history of turbulent structures in a stationary frame of reference is discussed.

B70-10667

## HEAT-TRANSFER DATA FOR HYDROGEN

MC CARTHY, J. R. /N. AM. ROCKWELL CORP./ MILLER, W. S. OKUDA, A. S. SEADER, J. D. DATE- DEC. 1970

M-FS-18754

Information is given regarding experimental heat-transfer data compiled for the turbulent flow of hydrogen within straight, electrically heated, round cross section tubes. Tube materials, test conditions, parameters studied, and generalized conclusions are presented.

B70-10670

## FLOW CHARACTERISTICS OF AN AIR JET IMPINGING ON A FLAT SURFACE

GAUNTNER, J. W. HRYCAK, P. /NEWARK COLL. OF ENG./ LEE, D. T. LIVINGOOD, J. N. B. DATE- DEC. 1970 REAN- SEE ALSO NASA-TN-D-5652,

NASA-TN-D-5690

LEWIS-11129

Survey develops adequate heat transfer correlations for design use. Flow characteristics studies include - potential core length, velocity and pressure distribution through the jet, and spread of jet and velocity decay along jet axis.

B70-10673

## LOW TEMPERATURE USES OF HELIUM

BROWN, G. V. DATE- DEC. 1970

LEWIS-11171

Helium is used for purging and pressurizing cryogenic rocket propellants, welding, atmosphere control, leak detection, and refrigeration. It provides the lowest possible liquid-bath temperature and produces superconductivity in certain materials. Its superfluid effects are used in superconducting magnets.

B70-10677

## COMPACT ELECTRIC HEATER

BLOCK, H. B. LUMANICK, S. MACOSKO, R. P. RICHTER, C. W. DATE- DEC. 1970 REAN- SEE ALSO NASA-TN-X-52778

LEWIS-11172

Forced convection electric heater heats inert gas flows to temperatures of from 1250 to 1650 deg F and tests Brayton power systems for advanced spacecraft. Heater has two basic components, a heat exchanger core and a containment vessel.

B70-10678

## DEVELOPMENT OF SUPERCONDUCTIVE MAGNETS

LAURENCE, J. C. DATE- DEC. 1970

LEWIS-11170

Survey of superconductive magnets considers - stabilization problems, advances in materials and their uses, and design evolution. Uses of superconducting magnets in particle accelerators and bubble chambers, as well as possible applications in magnetohydrodynamic and thermonuclear power generation and levitation are discussed.

B70-10680

## ASTRONAUT RESCUE AIR PACK /ARAP/ AND

EMERGENCY EGRESS AIR PACK /EEAP/  
 BARNHART, W. L. /BENDIX CORP./, CLEW, R. D.

WADDELL, H. M., JR. /N. AM. ROCKWELL CORP./

DATE- DEC. 1970

KSC-10522

Two designs for a lightweight, low profile, mobile rescue apparatus providing a 15-minute air supply and self-contained two-way communications assembly are described. Units are designed for astronaut use in hazardous environments.

B70-10681

## LESS-EXPENSIVE ROCHON PRISMS

AMMANN, E. O. /SYLVANIA ELECTRON. SYSTEMS/

MASSEY, G. A. DATE- DEC. 1970

M-FS-20554

Inexpensive Rochon prisms can be produced by substituting easily polished glass for one-half of the calcite. Reciprocal polarizing properties of a conventional Rochon prism are retained, and angular separation between ordinary and extraordinary rays is the same as in all-calcite prism.

B70-10683

## THEORETICAL STUDY OF A PLASMA ACCELERATOR

PEYRET, R. DATE- DEC. 1970 REAN- SEE ALSO

N67-16558

NPO-11480

Two-dimensional unsteady flow established in an electrodeless traveling wave plasma accelerator was theoretically analyzed to help explain, and possibly predict, phenomena appearing during experiments on problems of acceleration of an ionized fluid plasma.

B70-10686

## SINGLE-LEVEL RESONANCE PARAMETERS FIT NUCLEAR

## CROSS-SECTIONS

DRAWBAUGH, D. W. /WESTINGHOUSE ASTRONUC. LAB./

GIBSON, G. MILLER, M. PAGE, S. L. DATE- DEC.

1970

NUC-10101

Least squares analyses of experimental differential cross-section data for the U-235 nucleus have yielded single level Breit-Wigner resonance parameters that fit, simultaneously, three nuclear cross sections of capture, fission, and total.

B70-10690

## COMPARISON OF AERODYNAMIC NOISE FROM THREE

## NOSE-CYLINDER COMBINATIONS

GUENTHER, R. A. /LOCKHEED MISSILES AND SPACE

CO./ REDING, M. P. DATE- DEC. 1970

M-FS-20816

Results of experiments with three different cylinder and blunted nose combinations are discussed. Combinations include smooth cylinder with single 15 deg cone, smooth cylinder with double cone of 25 and 10 deg, and longitudinally corrugated cylinder with similar double cone.

B70-10694

## HIGH INTENSITY HEAT-PULSE SOURCE OPERATES

## WITHOUT COOLING SYSTEM

RUSSELL, L. D. DATE- DEC. 1970

ARC-10178

Tungsten-iodine quartz lamp with on-off control is mounted at focus of ellipsoidal reflector and shutter is mounted at conjugate focus. Flux sensor monitors lamp and actuates shutter which emits a heat pulse when the radiant flux builds up to requisite level.

B70-10711

## AN IMPROVEMENT IN BLACKBODY CAVITY DESIGN

SCHMIDT, R. M. /HONEYWELL, INC./ DATE- DEC. 1970

REAN- SEE ALSO NASA-CR-1583

LANGLEY-10292

Setting the axis of the conical cavity at an angle to the axis of observation removes the imperfection at the apex of the cone from the direct observation area of the radiometer. Fillet no longer behaves as a nonuniformity in the blackbody.

B70-10726

B70-10726

PERFORMANCE MAP OF A HEAT PIPE CHARGED  
WITH AMMONIA  
SCHWARTZ, J. DATE- DEC. 1970 REAN- SEE ALSO  
N65-20720  
NPO-11454

Test results are presented which describe dryout  
in type-304 stainless steel heat pipes when  
ammonia is the working fluid. Graph compares  
heat transfer capabilities of both ammonia and  
water. Heat pipe apparatus and performance are  
described.

## 04 MATERIALS/CHEMISTRY

B70-10004

TESTING FILAMENTARY COMPOSITES  
DOW, N. F. /GE/ ROSEN, B. W. DATE- MAY 1970  
REAN- SEE ALSO NASA-CR-66518  
HQ-10268

NOL ring split-dee tensile test has the  
advantages that the specimen is readily fabricated  
by winding and the test is performed in a  
conventional testing machine without special  
fixtures. Strain gages cannot be mounted,  
however, and substantial bending moments are  
introduced.

B70-10011

PREPARATION OF MAGNETIC FERROFLUIDS IN  
ALTERNATIVE CARRIER LIQUIDS  
ROSENSWEIG, R. E. /AVCO APPL. TECHNOL. DIV./  
DATE- JUL. 1970  
GSFC-10159

Ferrofluids are made by grinding magnetic  
particles together with a polar surfactant and a  
nonpolar solvent. The surfactant is adsorbed on  
the particle surfaces and acts as a coupling agent  
between the particles and the solvent.

B70-10013

QUANTITATIVE CONVERSION OF WATER TO CARBON  
DIOXIDE  
WARF, J. C. DATE- JUN. 1970  
NPO-10731

Method quantitatively converts water vapor to  
carbon dioxide permitting direct and rapid  
analysis of mixed-gas streams for water content.

B70-10017

DETERMINATION OF HYDROXYL CONTENT IN IMPURE  
MAGNESIUM OXIDE  
BLOSSER, E. R. HALL, E. H. IDEN, R. B. DATE-  
APR. 1970 REAN- SEE ALSO NASA-CR-96385  
NPO-10774

Three-step thermal process quantitatively  
determines the hydroxyl content in samples of  
magnesium oxide. Analytical method can be  
adapted to large-scale production of hydroxyl-free  
magnesium oxide.

B70-10027

A METHOD FOR THE VISUAL DETECTION OF HOLES  
IN THIN POLYMERIC FILMS  
VON VOLKLI, A. D. /BOEING CO./ WIEDEKAMP, K. E.  
DATE- APR. 1970  
LEWIS-10876

Back-lighting polymeric film with polarized light  
from a polarizing plate and viewing it through a  
second plate cross-polarized to the back-lighting  
provides visual contrast between the flaw and the  
transparent film.

B70-10054

UNIDIRECTIONAL COMPOSITE STIFFENING  
DOW, N. F. /GE/ ROSEN, B. W. DATE- MAY 1970  
REAN- SEE ALSO NASA-CR-66518  
HQ-10266

Simple structural elements are explored with  
configurations selected to best utilize composite  
materials. Combination of the biaxial properties  
of beryllium or an isotropic composite with the  
uniaxial properties of one directional filamentary  
reinforcement is studied.

B70-10058

DIRECTIONALLY SOLIDIFIED SUPERALLOY  
WALLACE, J. F. /CASE WESTERN RESERVE UNIV./  
DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-89651  
NASA-CR-89650  
HQ-10522

Cobalt-tungsten superalloy has improved stress  
rupture characteristics. Appropriate additions  
were made to this base alloy using microprobe  
analyses and a fractional factorial experiment.

B70-10080

PROPERTIES OF NONAQUEOUS ELECTROLYTES  
FOSTER, J. N. /N. AM. ROCKWELL CORP./ HANSON, D.  
C. BON, J. F. KELLER, R. MUIRHEAD, J. S. DATE-  
JAN. 1970 REAN- SEE ALSO NASA-CR-1425  
LEWIS-11017

Physical property measurements and structural  
studies conducted in aprotic solvents using  
various solutes are applicable to the further  
development of lithium batteries. Structural  
studies utilize nuclear magnetic resonance and  
electron paramagnetic resonance techniques.

B70-10081

RENE 41 HEAT TREATMENT ELECTRON MICROSCOPY  
HENSLEY, W. E. /N. AM. ROCKWELL CORP./ DATE-  
APR. 1970 REAN-SEE ALSO B69-10605 N69-71272  
M-FS-18633

Electron microscope helps prevent post-weld  
strain-age cracking of Rene 41 by identifying in  
advance microstructures that are detrimental to  
welding.

B70-10083

MECHANICAL SIEVE FOR SCREENING MINERAL  
SAMPLES  
OTTO, W. P. /CALIF. UNIV./ DATE- AUG. 1970  
HQ-10242

Mechanical sieve consists of three horizontal  
screens mounted in a vertical stack. A  
combination of rotation and tapping produces an  
even flow across the screens, dislodges trapped  
particles, and ensures rapid segregation of the  
sample.

B70-10084

ELECTRICAL RESISTANCE DETERMINATION OF  
ACTUAL CONTACT AREA OF COLD WELDED METAL  
JOINTS  
HORDON, M. J. /NORTON RES. CORP./ DATE- JUN.  
1970 REAN- SEE ALSO NASA-CR-97678  
HQ-10472

Method measures the area of the bonded zone of a  
compression weld by observing the electrical  
resistance of the weld zone while the load changes  
from full compression until the joint ruptures  
under tension. The ratio of bonding force to  
maximum tensile load varies considerably.

B70-10092

EFFECT OF HEAT TREATMENT AND SURFACE  
OXIDATION OF LOW-CYCLE FATIGUE LIFE OF  
INCONEL  
FOSTER, S. D. /N. AM. ROCKWELL CORP./ DATE- JUL.  
1970  
M-FS-18712

Test program involving specimens with different  
heat treatment, surface condition, and chemical  
composition yields low cycle fatigue data on  
Inconel 718.

B70-10094

ATMOSPHERIC COMPOSITION AFFECTS  
HEAT- AND MASS-TRANSFER PROCESSES  
BLAKELY, R. L. /MCDONNELL DOUGLAS CORP./ NELSON,  
W. G. DATE- JUN. 1970 REAN- SEE ALSO  
NASA-CR-891  
HQ-10271

For environmental control system functions  
sensitive to atmospheric composition, components  
are test-operated in helium-oxygen and  
nitrogen-oxygen mixtures, pure oxygen, and air.  
Transient heat- and mass-transfer tests are  
conducted for carbon dioxide adsorption on  
molecular sieve and for water vapor adsorption on  
silica gel.

B70-10100

TENSILE CREEP-RATE OF PYROLYTIC CARBON  
FISCHEBACH, D. B. DATE- JUN. 1970 REAN- SEE ALSO  
NASA-CR-103846  
NPO-11254

Stress-change technique, combined with a graphical-interpolation analysis, yields data on the stress and temperature dependence of the creep rate over broad strain and stress or temperature ranges on as-deposited, substrate-nucleated, pyrolytic carbon.

B70-10104

IMPROVED PROCESS OF FABRICATING FERRITE  
CORES FOR MAGNETIC LOGIC CIRCUITS  
BABA, P. D. /AMPEX CORP./ HECKLER, C. H.  
/STANFORD RES. INST./ DATE- JUN. 1970  
LANGLEY-10036

Method of processing magnetic ferrite structures enhances their partially set-state properties, so that the threshold magnetomotive force required to produce a specified change of flux is increased.

B70-10105

IMPROVED PROCESS FOR SYNTHESIZING  
ANILINOSILANE COMPOUNDS  
DUNNAVANT, W. R. /BATTELLE MEM. INST./ MARKLE,  
R. A. DATE- APR. 1970  
M-FS-14948

New process gives good yields of anilinosilane compounds that can be readily isolated in a high state of purity. S-collidine is used as an HCl acceptor. Silane compounds can be melt-condensed with aromatic diols to provide high molecular weight polyaryloxysilane materials that are of importance in polymer technology.

B70-10114

SOLUBILITY OF NON-POLAR GASES IN  
ELECTROLYTE SOLUTIONS  
WALKER, R. L., JR. /FLA. UNIV./ DATE- APR. 1970  
LEWIS-11052

Solubility theory describes the effects of both concentration and temperature on solute activity coefficients. It predicts the salting-out effect and the decrease in solubility of non-polar gases with increased electrolyte concentration, and can be used to calculate heats of solution, entropies, and partial molal volumes of dissolved gases

B70-10131

POLYMERIZATION OF PERFLUOROBUTADIENE  
NEWMAN, J. /MCDONNELL DOUGLAS CORP./ TOY, M.  
DATE- JUL. 1970  
NPO-10863  
Diisopropyl peroxydicarbonate dissolved in liquid perfluorobutadiene is conducted in a sealed vessel at the autogenous pressure of polymerization. Reaction temperature, ratio of catalyst to monomer, and amount of agitation determine degree of polymerization and product yield.

B70-10140

STRESS CORROSION CRACKING EVALUATION OF  
PRECIPITATION-HARDENING STAINLESS STEEL  
HUMPHRIES, T. S. NELSON, E. E. DATE- JUN. 1970  
M-FS-20667  
Accelerated test program results show which precipitation hardening stainless steels are resistant to stress corrosion cracking. In certain cases stress corrosion susceptibility was found to be associated with the process procedure.

B70-10146

THE COLUMBIUM-HYDROGEN SYSTEM AND HYDROGEN  
EMBRITTEMENT OF COLUMBIUM  
WALTER, R. J. /N. AM. ROCKWELL CORP./ DATE- AUG.  
1970  
M-FS-18659

Columbium specimens are charged uniformly with hydrogen allowing accurate measurement of the hydrogen content by a procedure involving the removal of hydrogen from flowing argon at 2000 degrees F. Hydrogen content effects on the ductile-to-transition temperature are determined for temperatures between 200 and 600 degrees F.

B70-10162

EFFECTS OF HIGH PRESSURE HYDROGEN ON METALS

CHANDLER, W. T. /N. AM. ROCKWELL CORP./ WALTER,  
R. J. DATE- APR. 1970  
M-FS-18612

Hydrogen environment embrittlement causes failure of hydrogen storage vessels at and below design pressures of 5000 to 6000 psi. Investigation of thirty-five alloys determines their susceptibility to such embrittlement.

B70-10175

HIGH TEMPERATURE RARE EARTH SOLID LUBRICANTS  
SLINEY, H. E. DATE- JUN. 1970 REAN- SEE ALSO  
NASA-TN-D-5301  
LEWIS-10983

Rare earth trifluorides have potential use as lubricating fillers for mechanical carbons and as coatings on metallic substrates. Friction experiments show that they are effective in reducing metallic wear.

B70-10177

NEUTRON-ACTIVATION ANALYSIS APPLIED TO  
COPPER ORES AND ARTIFACTS  
LINDER, N. F. DATE- APR. 1970  
ARG-10446

Neutron activation analysis is used for quantitative identification of trace metals in copper. Establishing a unique fingerprint of impurities in Michigan copper would enable identification of artifacts made from this copper.

B70-10182

PREPARATION OF FINE-PARTICLES AT CRYOGENIC  
TEMPERATURES  
GLOBUS, H. /AEROJET GEN. CORP./ DATE- APR. 1970  
NPO-10250

Flash freezing process yields gelling agent for use at cryogenic temperatures. Vaporized material, diluted with an inert gas, is injected below the surface of an agitated cryogenic liquid. This method disperses particles of chlorine trifluoride in liquid oxygen difluoride.

B70-10183

TUNGSTEN FIBER-REINFORCED NICKEL SUPERALLOY  
WITH GREATLY INCREASED STRENGTH AT  
2000 DEGREES F  
PETRASEK, D. W. SIGNORELLI, R. A. DATE- JUN.  
1970 REAN - SEE ALSO NASA-TN-D-5575  
LEWIS-10933

Superalloy has 1000-hour strength of 37,000 psi at 2000 degrees F. The strength to density ratio of the composite is also greater, permitting applications where reduced weight rather than greater strength is desired.

B70-10185

GRINDING AS AN APPROACH TO THE PRODUCTION  
OF HIGH-STRENGTH, DISPERSION-STRENGTHENED  
NICKEL-BASE ALLOYS  
ORTH, N. W. QUATINETZ, M. WEETON, J. W. DATE-  
APR. 1970 REAN- SEE ALSO NASA-TN-D-5421  
LEWIS-10515

Mechanical process produces dispersion-strengthened metal alloys. Power surface contamination during milling is removed by a cleaning method that involves heating thin shapes or partially-compacted milled powder blends in hydrogen to carefully controlled temperature schedules.

B70-10199

FATIGUE PROPERTIES OF SHEET, BAR, AND CAST  
METALLIC MATERIALS FOR CRYOGENIC  
APPLICATIONS  
GREEN, E. P. /N. AM. ROCKWELL CORP./ DATE- SEP.  
1970  
M-FS-18427

Cryogenic fatigue and tensile properties for metallic materials are determined in the operating life-time range of ten thousand to ten million cycles at room temperature, at minus 320 degrees F, and at minus 423 degrees F. Results are presented as stress versus number of cycles to failure.

B70-10205

DESIGN AND EVALUATION OF THREE-PHASE  
FIBROUS COMPOSITE STRUCTURES

B70-10206

DOW, N. F. /GE/ ROSEN, B. W. DATE- AUG. 1970  
REAN- SEE ALSO NASA-CR-66518  
HQ-10267

Study reveals composite combination evaluations for boron binder reinforcements for unidirectionally reinforced boron/epoxy, glass binder reinforcements for unidirectionally reinforced boron/epoxy, and glass binder reinforcements for unidirectionally reinforced glass/epoxy.

B70-10206

GROWTH OF PHASE-PURE, CRACK-FREE SINGLE CRYSTALS AND LARGE-GRAINED POLYCRYSTALS OF MOLYBDENUM DISILICIDE  
ROSSETTI, M. /LITTLE /ARTHUR D., INC./ DATE- APR. 1970 REAN- SEE ALSO NASA-CR-98504  
HQ-10450

High purity molybdenum disilicide crystals are prepared by zone melting sintered compacts. This method yields single crystals or polycrystals free from macrocracks which allow better measurement and evaluation of mechanical properties.

B70-10208

EFFECTS OF DECONTAMINATION, STERILIZATION, AND THERMAL VACUUM ON POLYMERIC PRODUCTS  
ROPER, W. D. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-103426  
NPO-11250

Adhesives, coatings, coated fabrics, elastomers, encapsulants, films, hardware and structural materials, and tapes are tested in a series of physical, mechanical, and electrical tests. Material properties are measured before and after exposure to the three environments.

B70-10210

OXIDATION RESISTANT IRON AND NICKEL ALLOYS FOR HIGH TEMPERATURE USE  
HILL, V. L. /IIT RES. INST./ MISRA, S. K. WHEATON, H. L. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-72522  
LEWIS-10936

Iron-base and nickel-base alloys exhibit good oxidation resistance and improved ductility with addition of small amounts of yttrium, tantalum /or hafnium/, and thorium. They can be used in applications above the operating temperatures of the superalloys, if high strength materials are not required.

B70-10213

MECHANICAL PROPERTIES OF RENE-41 AFFECTED BY RATE OF COOLING AFTER SOLUTION ANNEALING  
PRAGER, M. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970  
M-FS-18790

Investigation of Rene-41 cooling rate from 1975 to 1400 degrees F reveals that slow cooling improves high-temperature ductility and provides more uniform properties throughout a manifold. Ambient elongation and impact resistance are not significantly changed.

B70-10222

SELF-LUBRICATING FLUORINE SHAFT SEAL MATERIAL  
MUNK, W. R. /PRATT AND WHITNEY AIRCRAFT/ DATE- JUL. 1970  
HQ-10112

Lubricating film is produced by a reaction of fluorine with a composite of aluminum oxide and nickel powder. The rate of nickel fluoride generation is proportional to the rate at which the fluoride is rubbed off the surface, allowing the seal to operate with the lowest possible heating.

B70-10233

REACTIONS OF TECHNETIUM HEXAFLUORIDE WITH NITRIC ACID, NITROSYL FLUORIDE, AND NITRIL FLUORIDE  
HOLLOWAY, J. H. SELIG, H. DATE- APR. 1970  
ARG-10412

Stoichiometry of technetium hexafluoride reactions is studied. Magnetic properties and infrared spectra of reaction products are studied and compared with those of analogous complexes of the hexafluorides of tungsten, rhenium, and osmium.

B70-10235

USE OF NONWETTABLE MEMBRANES FOR WATER TRANSFER  
HAUSCH, H. G. DATE- DEC. 1970  
LANGLEY-10743

Transfer of water through nonwetable vinyl fluoride membranes has two unique features - /1/ very low water transfer rates can be held constant by holding temperature and solute concentrations constant, /2/ the pressure gradient against which water is transported is limited only by solution breakthrough or membrane strength.

B70-10243

TECHNIQUES FOR FORMING SKIN PANELS FOR LARGE-DIAMETER CYLINDERS FROM ALUMINUM-2014  
IRVINE, C. N. DATE- OCT. 1970  
M-FS-14385

Study of brake forming of skin panels from 2014 aluminum alloy concludes that forming from T651 temper is the best method available. T451 temper material has the greatest potential for production of stress-free parts. Age-forming characteristics of 2014-T451 and 2219-T37 alloys are compared.

B70-10258

PROGRESS IN RESEARCH ON CHLORATE CANDLE TECHNOLOGY  
LITTMAN, J. /GARRETT CORP./ DATE- APR. 1970  
MSC-13409 MSC-13410 MSC-13411

Research and development program improves sodium chlorate candle formulation, production method, and igniter design. Cobalt is used as the fuel, dry processing methods are used to lower the water content, and a device based on pyrotechnic heater concepts is used as the igniter.

B70-10259

METAL COOLDOWN, FLOW INSTABILITY, AND HEAT TRANSFER IN TWO-PHASE HYDROGEN FLOW  
MANSON, L. /N. AM. ROCKWELL CORP./ MILLER, W. S. DATE- MAY 1970 REAN- SEE ALSO B69-10541  
M-FS-18696

Studies of the properties of five metals with varying tube-wall thickness, with or without and internal coating of trifluorochloroethylene polymer, show that wall characteristics influence flow stability, affect heat transfer coefficients, and influence the transition point from dry- to wet-wall flow.

B70-10261

MECHANISM AND KINETICS OF AGING IN INCONEL 718  
HENSLEY, W. E. /N. AM. ROCKWELL CORP./ KOEPKE, B. G. ZETO, R. J. DATE- JUN. 1970  
M-FS-18775

Age hardening in Inconel 718 is investigated using Brinell hardness measurements. Formation of a precipitate causes an increase in hardness.

B70-10273

LIGHTWEIGHT, HIGH-STRENGTH, REINFORCED PLASTIC TUBE-FRANGING DIE  
BUSH, S. /NORTHROP CORP./ CASELDINE, H. SMITH, R. H. DATE- MAY 1970 REAN- SEE ALSO NASA-CR-66301  
LANGLEY-10126

Dies of a phenolic molding compound with chopped glass fibers as fill material possess a flexural strength of 20,000 psi and a compressive strength of 28,500 psi.

B70-10285

INVESTIGATION OF THE REACTIVITY OF ORGANIC MATERIALS IN LIQUID OXYGEN  
CHAMBERLAIN, D. /STANFORD RES. INST./ IRWIN, K. KIRSHEN, N. MILL, T. STRINGHAM, R. DATE- JUN. 1970  
M-FS-20576

Measurements of impact-ignition sensitivity and studies of the relative reactivity of t-butoxy and t-butyl peroxy radicals toward a variety of organic compounds reveal improved methods of selection of materials for safe use in a liquid oxygen environment.

B70-10294

DESIGN METHOD FOR ADSORPTION BEDS  
BLAKELY, R. /MCDONNELL DOUGLAS CORP./ JACKSON,  
J. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-891  
HQ-10269

Regenerable adsorption beds for long-term life support systems include synthetic geolite to remove carbon dioxide and silica gel to dehumidify the atmospheric gas prior to its passage through the geolite beds. Bed performance is evaluated from adsorption characteristics, heat and mass transfer, and pressure drop.

B70-10300

POLYIMIDE POLYMERS PROVIDE IMPROVED ABLATIVE MATERIALS

BURNS, E. /TRW SYSTEMS GROUP/ JONES, J.  
LUBOWITZ, H. DATE- JUL. 1970 REAN- SEE ALSO  
B69-10118  
LEWIS-10861

Principle heat absorption of silica-reinforced plastic ablative materials occurs from the in-depth reaction of silica with carbon to form silicon monoxide and carbon monoxide. The higher the degree of completion of this reaction, the higher the capacity of the ablative material to absorb heat.

B70-10310

HIGH PRECISION CRYOGENIC THERMAL CONDUCTIVITY STANDARDS

HUST, J. G. /NATL. BUR. OF STD./ POWELL, R. L.  
WEITZEL, D. H. DATE- JUN. 1970  
NUC-10555 NUC-10556

New apparatus allows accurate simultaneous measurement of thermal conductivity, electrical resistivity, and thermopower for technically important materials, such as new or uncommon alloys. A list of materials investigated is presented. Sources for obtaining data on these materials, as well as the source giving a description of the apparatus, are cited.

B70-10316

BIAXIAL PRESTRESSING OF BRITTLE MATERIALS

GRESZCZUK, L. /MCDONNELL DOUGLAS CORP./ MILLER,  
R. NETTER, W. DATE- JUN. 1970 REAN- SEE ALSO  
NASA-CR-98136  
M-PS-20272

Strengthening of chemically consolidated zirconia with tungsten fibers, graphite fibers, sapphire whiskers, and silicon carbide whiskers is investigated. Addition of silicon carbide whiskers gives the highest increase in strength of zirconia at room and elevated temperatures. Prestressing with tungsten cables increases tensile strength and ductility

B70-10327

CONTROLLED ETCHING OF PRINTED-CIRCUIT BOARDS

KOVALL, S. P. SCHUTT, J. B. DATE- AUG. 1970  
XGS-06306

Ferric chloride in an aqueous medium etches copper from the surface of printed-circuit boards. Ferric ions are reduced to ferrous ions resulting in a reduced etching rate.

B70-10330

POLYIMIDE POLYMERS PROVIDE HIGHER CHAR YIELD FOR GRAPHITIC STRUCTURES

BURNS, E. A. /TRW SYSTEMS GROUP/ JONES, J. F.  
LUBOWITZ, H. R. DATE- AUG. 1970 REAN- SEE ALSO  
B69-10118  
LEWIS-10860

Technique for manufacture of graphite composites uses high-char-forming processable polyimide resin systems to produce the graphitic matrix. Only three cyclic steps are required to yield a 99.7 percent graphite product.

B70-10333

UNIFORM DATA SYSTEM STANDARDIZES TECHNICAL COMPUTATIONS AND THE PURCHASING OF COMMERCIALY IMPORTANT GASES

JOHNSON, V. J. /NATL. BUR. OF STD./ MC CARTY, R.  
D. RÖDER, H. M. DATE- SEP. 1970  
NUC-10549

Integrated tables of pressure, volume, and

temperature for the saturated liquid, from the triple point to the critical point of the gases, have been developed. Tables include definition of saturated liquid curve. Values are presented in metric and practical units. Advantages of the new tables are discussed.

B70-10334

DIFUNCTIONAL POLYISOBUTYLENE PREPARED BY POLYMERIZATION OF MONOMER ON MOLECULAR SIEVE

MIDLER, J. A., JR. DATE- AUG. 1970  
NPO-10893

Process yields difunctional isobutylene polymers ranging in molecular weight from 1150 to 3600. These polymers have the potential for copolymerization and cross-linking with other monomers to form elastomeric materials.

B70-10349

OPEN-CELLED POLYURETHANE FOAM

RUSSELL, L. W. /AMETEK/STRAZA/ DATE- SEP. 1970  
KSC-10517

Open-celled polyurethane foam has a density of 8.3 pounds per cubic foot and a compressive strength of 295 to 325 psi. It is useful as a porous spacer in layered insulation and as an insulation material in vacuum tight systems.

B70-10353

PREPARATION OF HIGHLY FLUORINATED DIOLS CONTAINING ETHER LINKAGES.

ROCHOW, S. E. /PENINSULAR CHEMRES., INC./ STUMP,  
E. C., JR. DATE- SEP. 1970  
NPO-10768

Hydroxy-terminated perfluoroethers and polyurethane resins derived from ethers have outstanding chemical resistance and good thermal properties. They can be used as potting compounds, coatings, and seals. The hydroxy-terminated ethers serve as intermediates in the synthesis of highly fluorinated elastomers and adhesives.

B70-10361

SIMPLE METHOD FOR PREDICTING VISCOSITY OF GAS MIXTURES

BROKAW, R. S. DATE- OCT. 1970 REAN- SEE ALSO  
NASA-TN-D-4496  
LEWIS-11060

Method is derived from the Chapman-enskog theory which describes viscosities at low-to-moderate pressures. Mixtures of nonpolar gases require the viscosities and molecular weights of the constituents in addition to the mixture composition. Dipole moments, boiling points and liquid boiling point densities are also needed with polar gases.

B70-10364

LOW-TEMPERATURE EMBRITTLEMENT OF TI-6AL-4V AND INCONEL-718 BY HIGH PRESSURE HYDROGEN

CHANDLER, W. T. /N. AM. ROCKWELL CORP./ WALTER,  
R. J. DATE- NOV. 1970  
M-PS-18753

Notched specimens of titanium alloy and Inconel-718 exhibit little reduction of notch strength at certain low temperatures under 2000 lb/sq in. hydrogen, unnotched specimens are not embrittled at these temperatures. The degree of Inconel-718 embrittlement is lower than earlier observations under 1000 lb/sq in. hydrogen.

B70-10366

EFFECTS OF HYDROGEN ON ELI TITANIUM ALLOY

TI-5AL-2.5SN  
CHANDLER, W. T. /N. AM. ROCKWELL CORP./ HENSLEY,  
W. E. DATE- SEP. 1970  
M-PS-18815

Tensile tests on titanium alloy, following abrasion under hydrogen and temperature cycling, reveal lowered tensile strength, increased ductility, and no embrittlement. Fretting the metal on itself in flowing hydrogen or abrading with an iron file in flowing hydrogen produces titanium hydride.

B70-10369

THERMAL TREATMENT AND MECHANICAL PROPERTIES

B70-10386

OF ALUMINUM-2021

BRENNECKE, M. W. DATE- SEP. 1970 REAN- SEE ALSO  
NASA-TM-X-53847  
M-FS-20559

Mechanical properties, after thermal treatments, are summarized for sheet and plate of copper-rich, high-strength, heat-treatable aluminum-2021. The alloy is quench sensitive, quench rate and variations in aging affect corrosion behavior. Aging effects on yield strength, tensile strength, and elongation of sheet and plate are compared.

B70-10386

HEAT-REJECTION WINDOWS FOR TELESCOPES

AUSTIN, R. /PERKIN-ELMER CORP./ REHNBERG, J.  
DATE- SEP. 1970  
M-FS-20634

Heat-rejection telescope windows reflect incident solar energy outside the hydrogen-alpha line while processing a peak transmission exceeding fifty percent at 6563 angstrom units. The windows also function as secondary blocking filters to the telescope's Fabry-Perot filter.

B70-10396

INCREASED RESISTANCE TO STRESS CORROSION

OF ALUMINUM ALLOYS

BRUMMER, S. B. /TYCO LABS., INC./ COCKS, F. H.  
DATE- SEP. 1970  
M-FS-20788

Stress corrosion resistance is increased by distorting surface grain-boundary structure and by interrupting the corrosion and stress corrosion. The first is accomplished by machining or shot peening and the second by removal from and later reexposure to the corrosive environment.

B70-10402

IMPROVED PHOTOIONIZATION MASS SPECTROMETER

POSHCHENRIEDER, W. P. /GCA. CORP./ SAMSON, J. A.  
R. WARNECK, P. DATE- SEP. 1970 REAN- SEE ALSO  
NASA-CR-1018  
LANGLEY-10180

Improved spectrometer for gas analysis lessens the intensity problem that occurs in obtaining dispersed ultraviolet radiation. A filter, consisting of a selectively transmitting gas cell, a thin film or mirror, or a predispersing grating, alleviates problems of interference from higher-order spectral lines and from scattered ultraviolet light.

B70-10403

NEW HYPERTHERMAL THERMOSETTING

HETEROCYCLIC POLYMERS

BILLOW, N. /HUGHES AIRCRAFT CO./ LANDIS, A. L.  
MILLER, L. J. DATE- AUG. 1970 REAN- SEE ALSO  
NASA-CR-1310  
LANGLEY-10221

Polyimidazopyrrolone polymers, formed by the condensation of aromatic dianhydrides with aromatic tetraamines in various solvents, form moldings that resist degradation in air and retain great strength at 400 to 700 degrees F. The resins have good insulating properties, are easy to mold, and make good protective coatings.

B70-10404

DETONATION HAZARDS WITH \*\*SAFE\*\* INDUSTRIAL

SOLVENTS

FINGERHOOD, C. R. /N. AM. ROCKWELL CORP./ DATE-  
SEP. 1970  
LANGLEY-10299

Sensitivities of various metal/halocarbon slurries to impact are given. Barium and lithium shavings show sensitivity with all of the halocarbons tested except methyl chloroform. Powdered aluminum, magnesium titanium, and beryllium show sensitivity with several halocarbons but generally require a higher level of initial energy.

B70-10419

THIN FILM DEVICES USED AS OXYGEN PARTIAL

PRESSURE SENSORS

CANADY, K. S. /RES. TRIANGLE INST./ WORTMAN, J.  
J. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-1182  
XLA-06473

Electrical conductivity of zinc oxide films to be

used in an oxygen partial pressure sensor is measured as a function of temperature, oxygen partial pressure, and other atmospheric constituents. Time response following partial pressure changes is studied as a function of temperature and environmental changes.

B70-10423

STRAIN COMPATIBILITY TESTS FOR SPRAYED

FOAM CRYOGENIC INSULATION

HILL, W. L. /N. AM. ROCKWELL CORP./ KIMBERLIN,  
D. O. DATE- DEC. 1970  
M-FS-16063

Mechanical stress applied to foam-coated aluminum alloy specimens maintained at cryogenic temperature simulates actual use conditions of the foam insulation. The testing reveals defects in the polyurethane foam or in the foam to metal bond.

B70-10432

READILY FIBERIZABLE GLASSES HAVING A HIGH

MODULUS OF ELASTICITY

BACON, J. F. /UNITED AIRCRAFT CORP./ DATE- OCT.  
1970 REAN- SEE ALSO NASA-CR-789992  
HQ-10593

New glass compositions yield composites having higher moduli of elasticity and specific moduli of elasticity than commercially available glasses. Over a reasonable temperature range the glasses have a viscosity of about 20,000 poises. They consist of silica, alumina, magnesia, and beryllia, plus at least one uncommon oxide.

B70-10444

COPPER-TITANIUM EUTECTIC ALLOY IMPROVES

ELECTRICAL AND MECHANICAL CONTACT TO

SILICON CARBIDE

SHIER, J. S. DATE- NOV. 1970  
ERC-10256

Contact preparation at low temperatures is possible with the use of a copper-titanium eutectic alloy. Contacts formed with this alloy are ohmic on p-type silicon carbide and rectifying on n-type.

B70-10450

INTUMESCENT COATINGS AS FIRE RETARDANTS

FISH, R. H. FOHLEN, G. M. PARKER, J. A. SAWKO,  
P. M. DATE- SEP. 1970  
ARC-10099

Fire-retardant paint, when activated by the heat of fire, reacts to form a thick, low-density, polymeric coating or char layer. Water vapor and sulphur dioxide are released during the intumescent reaction.

B70-10453

PROCESS FOR SYNTHESIZING A NEW SERIES OF

FLUOROCARBON POLYMERS

TOY, M. S. /MCDONNELL DOUGLAS CORP./ DATE- NOV.  
1970  
NPO-10862

Two-step process for preparing fluorocarbon materials includes - /1/ adding gaseous fluorine to a polyperfluoropolyene to create fluorocarbon radicals, with reactive sites at unsaturated carbon atoms, and /2/ introducing a monomer, after evacuation of fluorine gas, and allowing copolymerization with the free radicals.

B70-10463

COLLOIDION TECHNIQUE OF MIRROR CLEANING

TYNDALL, J. B. DATE- AUG. 1970  
LANGLEY-10675

Cleaning method is modified by addition of a layer of cheesecloth between thin coatings of U.S.P. collodion. After drying, the collodion is peeled off by an even pull on the cheesecloth, leaving the mirror clean and ready for use.

B70-10467

FRICTION CHARACTERISTICS OF GRAPHITE AND

GRAPHITE-METAL COMBINATIONS AT VARIOUS

TEMPERATURES

HANJOINE, M. J. /WESTINGHOUSE ASTRONUC. LAB./  
DATE- NOV. 1970  
NUC-10151

Characteristics of the coefficient of friction of



graphite and of graphitic combinations between 70 and 4000 degrees F are given. Graphite's good frictional quality is attributed to a gas film on surface platelets. Major factors investigated are, surface finish and \*\*wear in\*\*, surface conditioning, temperature, and interfacial pressure.

B70-10475

TECHNIQUE FOR DEPOSITING SILICON DIOXIDE ON INDIUM ARSENIIDE IMPROVES ADHESION

SPON- INNOVATOR NOT GIVEN /GE/ DATE- SEP. 1970

REAN- SEE ALSO NASA-CR-86039, NASA-CR-86231

ERC-10130

Planar array processing of indium arsenide wafers includes dicing into a prescribed geometry, then cleaning and drying, and finally pre-oxidizing in an oxygen atmosphere at 500 degrees C. The last step forms an oxide interface between the InAs surface and a glow discharge deposited layer of silicon dioxide.

B70-10490

FLAME-RESISTANT THIN PANELS OF GLASS FABRIC-POLYIMIDE RESIN LAMINATES

KAUMEYER, R. A. /N. AM. ROCKWELL CORP./ YOSHINO, S. Y. DATE- NOV. 1970

MSC-15562

With a cured polyimide resin content of less than about 20 percent by weight of the finished part, glass fabric laminates which have good structural properties and are self-extinguishing in a pure oxygen atmosphere can be prepared in the thickness range of 0.035 to 0.08 inch.

B70-10497

NEW METHOD FOR PHOTORESIST STRIPPING

DAVERN, W. E. /GE/ TOBIN, L. S. DATE- SEP. 1970

ERC-10239

Vacuum dehydration of negatively working photoresist eliminates trace contamination of conventional stripping methods. The semiconductor substrate is coated with photoresist, exposed, developed, cured, and etched, and then placed in a vacuum. Following dehydration, the resist film is removable with ordinary solvents.

B70-10504

SOLUBLE HIGH MOLECULAR WEIGHT POLYIMIDE RESINS

JONES, R. J. /TRW SYSTEMS GROUP/ LUBOWITZ, H. R. DATE- OCT. 1970

LEWIS-11056

High molecular weight polyimide resins have greater than 20 percent /by weight/ solubility in polar organic solvents. They permit fabrication into films, fibers, coatings, reinforced composite, and adhesive product forms. Characterization properties for one typical polyimide resin are given.

B70-10506

EFFECTS OF CRYSTAL DEFECTS ON STRESS-CORROSION SUSCEPTIBILITY IN ALUMINUM ALLOY 7075

BENTLE, G. G. /N. AM. ROCKWELL CORP./ JACOBS, A. J. DATE- SEP. 1970 REAN- SEE ALSO B67-10533,

B68-10153, B70-10527

M-FS-18794

Point defects were introduced into specimens of three heat-treated tempers of alloy 7075 by neutron irradiation. Continuous ultrasonic monitoring allowed crack growth to be observed. Effects on stress-corrosion susceptibility, elongation, hardness, and yield strength are noted and compared for the three tempers.

B70-10520

NONDESTRUCTIVE SPOT TESTS ALLOW RAPID IDENTIFICATION OF METALS

WILSON, M. L. DATE- SEP. 1970

LANGLEY-10539

Ordered qualitative test sequence, presented in flow chart form, permits identification of all common metallurgical elements and many high-temperature, stainless, high and low carbon, and tool steels within about 30 minutes. Identification is made from colors or specific

reactions produced by the addition of standard chemical reagents.

B70-10527

THE MECHANISM OF STRESS-CORROSION CRACKING IN 7075 ALUMINUM ALLOY

JACOBS, A. J. /N. AM. ROCKWELL CORP./ DATE- OCT. 1970

M-FS-18614

Various aspects of stress-corrosion cracking in 7075 aluminum alloy are discussed. A model is proposed in which the continuous anodic path along which the metal is preferentially attacked consists of two phases which alternate as anodes.

B70-10531

ECONOMIC METHOD FOR MEASURING ULTRA-LOW FLOW RATES OF FLUIDS

BOGDANOVIC, J. A. /NORTHROP CORP./ KELLER, W. F. DATE- OCT. 1970

NPO-12064

Capillary tube flowmeter measures ultra-low flows of very corrosive fluids /such as chlorine trifluoride and liquid fluorine/ and other liquids with reasonable accuracy. Flowmeter utilizes differential pressure transducer and operates on the principle that for laminar flow in the tube, pressure drop is proportional to flow rate.

B70-10540

CHEMICAL TREATMENT MAKES AROMATIC POLYAMIDE FABRIC FIREPROOF IN OXYGEN ATMOSPHERE

CARDWELL, R. O. /MONSANTO RES. CORP./ HOLSTEN, J. R. RIVES, J. W. DATE- NOV. 1970

MSC-13571 MSC-13572

Organic fabric is reacted first with vapors of a phosphorus oxychloride, phosphorus oxybromide solution and then with bromine vapor, after neutralization it is flameproof in pure oxygen atmosphere. Soaking the fabric with mixture of ammonium polyphosphates increases flame resistance, but the polyphosphates are leached out during laundering.

B70-10546

NEW TYPE OF NONFLAMMABLE PAPER

ARMSTRONG, G. K. /DYNATECH CORP./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-101977

MSC-13432

Nonflammable paper is made from fibers of chrysotile asbestos, beta-glass fibers, glass microfibers, and a little nonflammable organic binder. It does not propagate flame in an atmosphere of 16.5-psig oxygen, and it is resistant to rot and mold, making it acceptable as wrapping material and for stored documents.

B70-10551

PREPARATION OF THIN POLYMER FILMS FOR INFRARED REACTION RATE STUDIES

GARRARD, G. G. /N. AM. ROCKWELL CORP./ HOUSTON, D. W. DATE- NOV. 1970

MSC-15893

Procedure for preparing thin films for infrared spectrophotometric analysis involves pressing of a neat mixture of reactants between nonreactive thin polymer films with noninterfering absorption bands. Pressing is done under a pressure that gives desirable thickness. Following this process, the film sandwich is cut to accommodate the laboratory instrument.

B70-10571

ELECTRON FRACTOGRAPHY USED TO EXAMINE NICKEL-BASE ALLOYS

JEWETT, R. P. /N. AM. ROCKWELL CORP./ DATE- NOV. 1970

M-FS-18649

Electron fractography establishes causes of metal fatigue and stress failures. Technique produces surface features at magnification as high as 9000X with excellent resolution. Method permits observation of features with dimensions of only 50 angstroms.

B70-10573

FILLED POLYMERS FOR BEARINGS AND SEALS USED IN LIQUID HYDROGEN

JOHNSON, R. L. WISANDER, D. W. DATE- OCT. 1970

B70-10574

REAN- SEE ALSO NASA-TN-D-5073  
LEWIS-10887

Filled polytrifluorochloroethylene /PTFCE/ shows better thermal stability, less creep, and higher compressive moduli than filled polytetrafluoroethylene /PTFE/. Bearing and seal materials exhibiting the best characteristics contain a high percentage of PTFCE.

B70-10574

PHOTOCHROMISM OF DIHYDROQUINOLINES

BECKER, R. S. /HOUSTON UNIV./ KOLC, J. DATE- DEC. 1970  
HQ-10574

Reversible photochromic reactions, in which absorption spectrum of chemical compound may be shifted by application of visible or ultraviolet light, and then returned to original state by heating, are observed for certain members of 1,2-dihydroquinoline family. Structural formulas for colorless and colored states are given.

B70-10576

LOW-TEMPERATURE RADIATION-RESISTANT MATERIAL FOR BALL-BEARING RETAINERS

DESAU, P. O. /AEROJET-GEN. CORP./ EMMONS, W. F. DATE- NOV. 1970  
NUC-10058

Radiation resistant material, made of polyimide polymers and S-glass cloth, is used in ball bearing retainers for extreme environments. Material displays satisfactory wear resistance, lubricity, and stability. Results of comparative tests with fluorocarbon materials are given.

B70-10578

LOW TEMPERATURE ABLATION MODELS MADE BY PRESSURE/VACUUM APPLICATION

FISCHER, M. C. HEIER, W. C. DATE- NOV. 1970  
LANGLEY-10676

Method developed employs high pressure combined with strong vacuum force to compact ablation models into desired conical shape. Technique eliminates vapor hazard and results in high material density providing excellent structural integrity.

B70-10585

SILICON SOLAR CELLS IMPROVED BY LITHIUM DOPING

BERMAN, P. A. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-106770  
NPO-11390

Results of conference on characteristics of lithium-doped silicon solar cells and techniques required for fabrication indicate that output of cells has been improved to point where cells exhibit radiation resistance superior to those currently in use, and greater control and reproducibility of cell processing have been achieved.

B70-10588

DETERMINATION OF NITROGEN IN TITANIUM NITRIDE

PHILIPP, W. H. TETZLAFF, J. E. DATE- NOV. 1970  
LEWIS-11046

Quantitative determination of nitrogen in titanium nitride involves dissolution of TiN in 10M hydrofluoric acid containing an oxidant. Released nitrogen is determined as ammonia. Best oxidizers are ferric chloride, potassium iodate, and potassium dichromate.

B70-10600

POTASSIUM SILICATE-ZINC OXIDE SOLUTION FOR METAL FINISHES

SCHUTT, J. B. DATE- DEC. 1970  
GSFC-10361

Examples of zinc dust formulations, which are not subject to cracking or crazing, are fire retardant, and have high adhesive qualities, are listed. The potassium silicate in these formulations has mol ratios of dissolved silica potassium oxide in the range 4.8 to 1 - 5.3 to 1.

B70-10612

EVALUATION OF POLYMERIC PRODUCTS FOR USE IN THERMAL-VACUUM ENVIRONMENT

MURACA, R. F. /STANFORD RES. INST./ WHITTICK, J.

S. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-89557  
NPO-11288

Of 350 materials screened for outgassing characteristics, 100 qualify within the limits of less than 1 percent weight loss and less than 0.1 percent VCM /volatile condensable material/ content. Infrared absorbance spectra of the VCM from 96 polymeric products and an interim list of recommended products are identified.

B70-10618

RESONANCE TUBE IGNITER

CONRAD, E. W. PAVLI, A. J. PHILLIPS, B. R. DATE- NOV. 1970 REAN- SEE ALSO NASA-TN-X-1460  
LEWIS-11219

Resonance induced in stoichiometric mixtures of gaseous hydrogen-oxygen produces temperatures /over 1100 deg F/ high enough to cause ignition. Resonance tube phenomenon occurs when high pressure gas is forced through sonic or supersonic nozzle into short cavity. Various applications for the phenomenon are discussed.

B70-10621

STAINLESS STEEL 301 AND INCONEL 718

HYDROGEN EMBRITTLEMENT

ALLGEIER, R. K. FORMAN, R. DATE- DEC. 1970  
MSC-13557

Conditions and results of tensile tests of 26 Inconel 718 and four cryoformed stainless steel specimens are presented. Conclusions determine maximum safe hydrogen operating pressure for cryogenic pressure vessels and provide definitive information concerning flaw growth characteristics under the most severe temperature and pressure conditions

B70-10634

HIGH-TEMPERATURE OXIDATION AND

EROSION-RESISTANT REFRACTORY COATINGS

PETERSON, D. A. WINTER, J. M. DATE- NOV. 1970  
REAN- SEE ALSO NASA- NASA-TN-D-4964  
LEWIS-11221

Various refractory coating systems were evaluated for rocket nozzle applications by actual rocket test firings. A reference is noted which identifies failure mechanisms and gives results of the firing tests for 18 coating systems. Iridium, iridium-rhenium, and hafnium oxide-zirconium oxide coatings show most promising results.

B70-10644

NONFLAMMABLE ORGANIC ADHESIVES EFFECTIVE OVER

WIDE TEMPERATURE RANGE

MC LEOD, A. /WHITTAKER CORP./ DATE- DEC. 1970  
REAN- SEE ALSO NASA-CR-102176  
MSC-13586

Series of highly fluorinated polyurethanes have been prepared as basis for development of nonflammable structural adhesives for use over wide temperature range. Backbone of polyurethanes is polyether of perfluoropropylene oxide. Adhesive system is developed that exhibits adequate strength properties and is self-extinguishing in oxygen-rich atmospheres.

B70-10645

INHIBITED 1,1,1-TRICHLOROETHANE REPLACES

TRICHLOROETHYLENE FOR DEGREASING

SCHULER, F. T. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970

M-FS-18844 M-FS-18845

In fight against air pollution inhibited TCE /1,1,1-trichloroethane/ is effective substitute for trichloroethylene in degreasing plants. This chemical has only slight photochemical activity and causes little eye irritation. TCE is less toxic than trichloroethylene and can withstand production loads and conditions, or long term storage, without degradation.

B70-10661

SPECTRAL EMISSION MEASUREMENT OF IGNEOUS

ROCKS USING A SPECTRORADIOMETER

HUNTON, W. D. DATE- DEC. 1970  
M-FS-20837

Spectroradiometer is used for either close or remote identification of rocks not heated to high temperatures. Instrument yields reproducible

data spectra with excellent signal-to-noise ratios and readily identifiable spectral details, including differences in subclasses.

B70-10666

# INEXPENSIVE, REMOVABLE COATING FOR PLASTER TOOLING

DIMINO, J. M. /N. AM. ROCKWELL CORP./ MARTIN, R. R. DATE- DEC. 1970  
MSC-15819

Procedure for thinning and spaying a vinyl material provides strippable film for plaster surfaces. Coating is low-cost, effective seal against moisture and other sources of damage. Coating consists of a mixture of hot-spray vinyl material and 30 to 50 percent by volume of methyl ethyl ketone.

B70-10672

# LOW-COST HIGH-TEMPERATURE BRAZING MATERIAL

REPAS, G. TULISIAK, G. DATE- DEC. 1970  
LEWIS-11209

Commercially available nickel-copper wire containing 6 and 12 percent nickel is used in high temperature furnace brazing of rocket engine parts. Brazed joints have properties comparable to or better than those brazed with more expensive materials, and cost savings are substantial.

B70-10674

# OXIDATION-RESISTANT COATINGS FOR REFRACTORY METALS USED IN INERT ATMOSPHERES

PHILLIPS, W. M. DATE- DEC. 1970 REAN- SEE ALSO  
N67-15683  
NPO-11477

Test conditions and results are reported for various coatings on a 1 percent zirconium columbium alloy at a temperature of 2000 deg F. Molybdenum silicide over molybdenum is most effective coating, tin-aluminum coating is adequately protective, chromium-molybdenum silicides are not protective.

B70-10676

# CRYSTAL GROWING BY ELECTRODEPOSITION FROM DENSE GASEOUS SOLUTIONS

NAIDITCH, S. /UNITED SCI. ASSOCIATES, INC./ WILLIAMS, R. A. DATE- DEC. 1970  
NPO-10440

Single crystals and dendritic formations of silver are grown on platinum electrodes by electrodeposition from a dense gaseous solution of silver nitrate in ammonia. Process is modification of hydrothermal process, and also differs from standard electrodeposition by permitting single crystals to be grown from hydrogen-bonded solvents.

## 05 LIFE SCIENCES

B70-10001

# IMPROVED APPARATUS FOR CONTINUOUS CULTURE OF HYDROGEN-FIXING BACTERIA

FOSTER, J. F. /BATTELLE MEM. INST./ LITCHFIELD, J. H. DATE- SEP. 1970 REAN- SEE ALSO  
NASA-CR-1296, NASA-CR-90111  
HQ-09000

Improved apparatus permits the continuous culture of *Hydrogenomonas eutropha*. System incorporates three essential subsystems - /1/ environmentally isolated culture vessel, /2/ analytical system with appropriate sensors and readout devices, /3/ control system with feedback responses to each analytical measurement.

B70-10006

# A MATHEMATICAL MODEL OF THE EFFECT OF A PREDATOR ON SPECIES DIVERSITY

WESTON, C. R. YANG, J. N. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-101669  
NPO-11230

Mathematical model determines reaction between new predator and microbe competitor when the competitor is the predator's sole nutrient resource. The model utilizes differential equations to describe the interactions with the

specific growth rates, and analyzes these growth rates as they are affected by population density and nutrient concentration.

B70-10030

# CONTOUROGRAPH DISPLAY SYSTEM FOR MONITORING ELECTROCARDIOGRAMS

GOLDEN, D. P., JR. MAUDLIN, D. G. WOLTHUIS, R. A. GOLDEN, D. P. J/TECHNOL. INC./ DATE- OCT. 1970  
MSC-13407

Electrocardiogram is displayed as a contourogram on the cathode ray tube of a variable-persistence oscilloscope. Each cycle is stacked below its predecessors giving a three dimensional effect. A major change in the signal is apparent as a change in the contourogram pattern.

B70-10107

# DETECTION AND LOCATION OF METAL FRAGMENTS IN THE HUMAN BODY

BROWN, R. L. NEUSCHAEFER, R. W. DATE- FEB. 1970  
M-FS-14797

Portable electronic device, based on the design of an eddy current gage, detects ferrous and nonferrous metal fragments. Device is more easily transported than X-ray equipment and does not present a radiation hazard.

B70-10125

# DESIGN AND DEVELOPMENT CRITERIA FOR METAL BELLOWS

GERLACH, C. R. /SOUTHWEST RES. INST./ SCHROEDER, E. C. DATE- SEP. 1970  
M-FS-20640

Experimental research describes fluid flow and the fluid-elastic mechanism causing bellows flow excitation, and aids in design of conventional bellows liner which suppresses flow-induced vibrations. Analytical models facilitate prediction of flow excitation occurrence and estimation of severity of bellows vibrations.

B70-10201

# PREDICTION OF GAS LEAKAGE OF ENVIRONMENTAL CONTROL SYSTEMS

JACKSON, J. K. /DOUGLAS AIRCRAFT CO./ THOMAS, E. C. DATE- APR. 1970 REAN- SEE ALSO NASA-CR-891  
HQ-10270

Mathematical models of leakage configurations and various flow theories are presented with the substantive experimental test data to provide background material for future design and failure analysis. Normal-rate leakage and emergency, high-rate leakage are considered.

B70-10253

# MICROFLORA IN SOILS OF DESERT REGIONS

CAMERON, R. E. DATE- SEP. 1970 REAN- SEE ALSO  
NASA-CR-101127  
NPO-11215

Desert soil samples, collected using aseptic techniques, are low in organic matter and cation exchange capacity. Aerobic and microaerophilic bacteria are most abundant, next are algae and molds. Chemical and physical properties are determined by standard procedures, including the Kjeldahl method and the use of Munsell soil color charts.

B70-10254

# INFLATABLE STRETCHER TO TRANSPORT PATIENTS

CLARK, C. C. /MARTIN CO./ GORDON, F. T., JR. SCHMIDT, C. B. DATE- APR. 1970  
HQ-10179

Inflatable plastic bag inside strong, inflexible outer bag facilitates emergency transport of seriously burned or disabled patients. When the bag is inflated the patient is completely immobilized and cushioned from external shock. Air for breathing, temperature controls and communications may be provided by appropriate plug-in connections.

B70-10255

# BIOLOGICAL HANDBOOK FOR ENGINEERS

SPON- INNOVATOR NOT GIVEN /GE/ DATE- DEC. 1970  
M-FS-20349

Microbiological background information is compiled

B70-10401

in handbook for engineers and scientists working on bio-related projects. It is intended as aid in - /1/ evaluating effects of engineering procedures on microbial life, /2/ determining effects of decontamination and sterilization on performance of overall systems, and /3/ understanding language of microbiologists.

B70-10401

**AUTOMATIC OPTOMETER OPERATES WITH INFRARED TEST PATTERN**

CORNSWEET, T. N. /STANFORD RES. INST./ CRANE, H. D. DATE- NOV. 1970 REAN- SEE ALSO B70-10568

ARC-10095

Refractive strength of human eye is monitored by optometer that automatically and continuously images infrared test pattern onto the retina. Condition of focus of the eye at any instant is determined from optometer settings needed to maintain focus of the pattern on the retina.

B70-10420

**ULTRA-FLEXIBLE BIOMEDICAL ELECTRODES AND WIRES**

ROSITANO, S. A. DATE- SEP. 1970

ARC-10268

Soft, flexible electrode conforms to body contour during body motion. It is fabricated from an elastomer impregnated with a conductive powder which can be configured into any required shape, including a wire shape to connect the electrode directly to an electrical instrument or to a conventional metallic wire.

B70-10436

**POST-OPERATIVE CRANIAL PRESSURE MONITORING SYSTEM**

FAGER, C. A., JR. /LAHEY CLINIC/ LONG, L. E. TRENT, R. L. DATE- DEC. 1970

ERC-10336

System for monitoring of fluidic pressures in cranial cavity uses a miniaturized pressure sensing transducer, combined with suitable amplification means, a meter with scale calibrated in terms of pressures between minus 100 and plus 900 millimeters of water, and a miniaturized chart recorder covering similar range of pressures.

B70-10447

**BIOMEDICAL SENSING AND DISPLAY CONCEPT IMPROVES BRAIN WAVE MONITORING**

TRENT, R. L. DATE- DEC. 1970

ERC-10233

Concept for increasing effectiveness of biomedical sensing and display promises greater monitoring capability while lessening high skill requirements in operating personnel. New concept overcomes deficiencies of current system by employing increased number of probes and microelectronic preamplifiers.

B70-10456

**ELIMINATION OF GASES AND CONTAMINATION FROM WATER**

BUCK, A. P. /TWA, INC./ DATE- SEP. 1970

KSC-10502

Filtration system with membrane type hydrophilic and hydrophobic filters gives absolute filtration with automatic venting of freed gases, and prevents backward transmission of contamination with no bacterial growth through the filters. Filter aids in degassing industrial solutions and in removing oxygen from sea water.

B70-10469

**CONTROL SYSTEM FOR AN ARTIFICIAL HEART**

GEBBEN, V. D. WEBB, J. A., JR. DATE- OCT. 1970

REAN- SEE ALSO NASA-TM-X-1953

LEWIS-11057

Inexpensive industrial pneumatic components are combined to produce control system to drive sac-type heart-assistance blood pump with controlled pulsatile pressure that makes pump rate of flow sensitive to venous /atrial/ pressure, while stroke is centered about set operating point and pump is synchronized with natural heart.

B70-10525

**SIMPLE CHAMBER FACILITATES CHEMILUMINESCENT**

**DETECTION OF BACTERIA**

HARTS, E. C. WILKINS, J. R. DATE- SEP. 1970

LANGLEY-10705

Test chamber enables rapid estimation of bacteria in a test sample through the reaction of luminol and an oxidant with the cytochrome C portion of certain species of bacteria. Intensity of the light emitted in the reaction is a function of the specific bacteria in the test sample.

B70-10528

**TECHNIQUE FOR ANALYZING HUMAN RESPIRATORY PROCESS**

LIU, F. F. /QUANTUM-DYN., INC./ DATE- OCT. 1970

MSC-13436

Electronic system /MIRACLE 2/ places frequency and gas flow rate of the respiratory process within a common frame of reference to render them comparable and compatible with \*\*real clock time.\*\* Numerous measurements are accomplished accurately on a strict one-minute half-minute, breath-by-breath, or other period basis.

B70-10529

**MEDICAL VEST BROADENS TREATMENT CAPABILITY**

JOHNSON, G. S. /TRANS WORLD AIRLINES, INC./

DATE- OCT. 1970

KSC-10577

Universal sized vest, with specially tailored pockets designed to hold medical supplies, provides first aid/first care medical teams with broadened on-site capability. Vest is made of nylon, tough fibrous materials, and polyvinyl chloride. Design facilitates rapid donning, doffing, and adjustment.

B70-10545

**COMBINATION SYRINGE PROVIDES AIR-FREE BLOOD SAMPLES**

POOL, S. L. DATE- NOV. 1970

MSC-12320

Standard syringe and spinal needle are combined in unique manner to secure air-free blood samples. Combination syringe obtains air free samples because air bubbles become insignificant when samples greater than 1 cc are drawn.

B70-10568

**VISUAL FOCUS STIMULATOR AIDS IN STUDY OF**

**THE EYE'S FOCUSING ACTION**

CORNSWEET, T. N. /STANFORD RES. INST./ CRANE, H. D. DATE- NOV. 1970 REAN- SEE ALSO B70-10401

ARC-10049

Optical apparatus varies apparent distance of a target image from the eye by means of reflectors that are moved orthogonally to the optical axis between fixed lenses. Apparatus can be pointed at any object, test pattern, or other visual display.

B70-10619

**HUMAN PERFORMANCE MEASURING DEVICE**

MICHAEL, J. SCOW, J. DATE- DEC. 1970

LANGLEY-10679

Complex coordinator, consisting of operator control console, recorder, subject display panel, and limb controls, measures human performance by testing perceptual and motor skills. Device measures psychophysiological functions in drug and environmental studies, and is applicable to early detection of psychophysiological body changes.

B70-10697

**BIOMEDICAL RECORDING SYSTEM**

VICK, H. A. VIC, H. A. /NORTHROP CORP./

DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-101978

MSC-13653

System collects medical data directly from patients and permanently records and displays several parameters - electrocardiograph, electroencephalograph, heart rate, respiration rate, auscultatory blood pressure, leg circumference changes, body temperature, and time. Components and operation of the system are described.

## 06 MECHANICS

B70-10012

SONIC IMPEDANCE TECHNIQUE DETECTS FLAWS IN  
POLYURETHANE FOAM SPRAY-ON INSULATION  
HARALSON, H. S. /SPACO, INC./ HAYNES, J. L.  
DATE- AUG. 1970 REAN- SEE ALSO NASA-TM-X-53852  
M-FS-20561

Sonic impedance testing detects voids and unbonded regions as small as 1 inch in diameter by 0.03 inch thick. Measurements are made manually or by automatic scanning and the readout is made by meter or recorder.

B70-10062

DISCHARGE COEFFICIENTS FOR THICK-PLATE  
ORIFICES

METGER, G. W. RHODE, J. E. RICHARDS, H. T.  
DATE- APR. 1970 REAN- SEE ALSO NASA-TN-D-5467  
LEWIS-11067

Investigation enables more accurate prediction of coolant flows within internally cooled turbine blades and vanes. The data is applicable for predicting flows in complex flow passages.

B70-10093

CALCULATION OF INCOMPRESSIBLE FLUID FLOW  
THROUGH CAMBERED BLADES

HSU, C. C. /HYDRONAUTICS, INC./ DATE- SEP. 1970  
REAN- SEE ALSO NASA-CR-100773, NASA-CR-102416  
M-FS-20503

Conformal mapping technique yields linear, approximate solutions for calculating flow of an incompressible fluid through staggered array of cambered blades for the cases of flow with partial cavitation and supercavitation. Lift and drag coefficients, cavitation number, cavity shape, and exit flow conditions can be determined.

B70-10116

PREDICTION OF FAULTS IN COMPONENTS OF  
MACHINERY IN MOTION

TATGE, R. B. /GE/ DATE- FEB. 1970 REAN- SEE  
ALSO NASA-CR-99189  
GSPC-10801

Mechanical vibrations of individual moving parts are sensed with piezoelectric accelerometers and measured electronically from outside the working machine.

B70-10124

METHOD OF CALCULATING BLADE-TO-BLADE PLANE  
FLOW IN CENTRIFUGAL PUMP

JACKSON, E. D. /N. AM. ROCKWELL CORP./ DATE-  
JUN. 1970 REAN- SEE ALSO NASA-CR-80153  
M-FS-18087

Steam filament solution determines velocity distribution due to potential flow in the blade-to-blade plane of the radial impeller. This is used to determine the mass-averaged relative fluid angle, which is in turn used in an axisymmetric program to obtain steam surfaces of the assumed axisymmetric flow.

B70-10156

VOLUMETRIC CALIBRATION OF A PROPELLANT  
UTILIZATION SYSTEM

LENNING, J. J. /MCDONNELL-DOUGLAS CO./ SIMKO, T.  
DATE- APR. 1970  
M-FS-14943

Method of calibrating capacitance-type propellant mass sensors provides meaningful mass units accurate to within one percent of the total load. Neither special propellant loading nor test firing is required. Recalibration of the system is possible without special propellant loading. This method provides increased flexibility for vehicle operation.

B70-10166

TWO-DIRECTIONAL-FLOW, AXIAL-MOTION-JOINT  
FLOW LINER

BISSING, L. L. /N. AM. ROCKWELL CORP./ INNES, G.  
M. DATE- APR. 1970  
M-FS-16215

Flow liner eliminates high-cycle fatigue in ducts carrying cryogenic fluids. It is capable of handling two-directional, high-velocity cryogenic liquid flow with a 3-inch axial motion without binding within a 25-inch length.

B70-10224

SPRAY MOMENTUM MEASURING EQUIPMENT

SHEFFIELD, E. W. /TRW SYSTEMS GROUP/ DATE- APR.  
1970  
MSC-12305

Technique to measure momentum of fluid ejected from an orifice helps predict erosion produced by a fluid spray. Using standard water flow bench, strain gage force measuring cell is combined with momentum probe and rotating carriage to produce circumferential momentum profile from which localized erosion characteristics are derived.

B70-10225

SIMPLIFIED COMPUTATION OF COMPRESSIBLE  
FLUID FLOW PARAMETERS

BEINGRABEN, H. W. /BOEING CO./ DATE- SEP. 1970  
KSC-10400

Mathematical techniques analyze fluid flow through circular duct, enlarged or constricted circular duct, and across an orifice or nozzle. Using subsonic Mach number as basic flow parameter, a series of working graphs displays the variation of various physical parameters in each of the flow conditions.

B70-10227

REMOVAL OF FLOWMETER BEARINGS FROM BLIND  
CAVITIES

LINQUIST, J. J. /N. AM. ROCKWELL CORP./ DATE-  
APR. 1970  
M-FS-18713

Bearings are removed by the application of a simple hydraulic principle using beeswax in place of a liquid.

B70-10236

STABILITY OF STRUCTURAL RINGS UNDER UNIFORMLY  
DISTRIBUTED RADIAL LOADS

WILLIAMS, H. E. DATE- DEC. 1970 REAN- SEE ALSO  
NASA-CR-107848  
NPO-11396

Energy method analysis establishes parameters governing stability of circular rings acted upon by constant, uniformly distributed loads. Energy method is used so that nonlinear behavior of structure before buckling can be accounted for. Method affords conceptually superior basis for analyzing the axisymmetric deviation mode.

B70-10252

HEAT-RESISTANT PRESSURE PROBE WITH  
HIGH-FREQUENCY RESPONSE

ROGERO, R. S. DATE- OCT. 1970  
NPO-11292

Probe, having a sensor at its inner tip in intimate contact with pressure transients, measures pressure wave fluctuations through an engine's combustion chamber. A film of flexible opaque material on the face of the sensor prevents high radiation fluxes from heating the quartz crystal and thus changing the electrical characteristics.

B70-10274

THE USE OF THE CHATTER MODE IN SELF-ADAPTIVE  
SYSTEMS

YASUI, S. /MIT/ DATE- APR. 1970 REAN- SEE ALSO  
NASA-CR-88700  
HQ-10159

Chatter mode is used advantageously if the ideal model dynamics is described by a switching function, the chatter mode is reached quickly and then sustained, the chatter frequency is reduced, and any zero in the plant transfer function is cancelled.

B70-10288

CRITICAL SPEED ANALYSIS OF ROTORS

CAVICCHI, R. H. DATE- MAY 1970 REAN- SEE ALSO  
NASA-TN-D-4858  
LEWIS-11061

General frequency equation is developed for both

forward and backward precession of rigid rotors in undamped bearings on flexible foundations. As well as major critical speeds, nonsynchronous critical speeds that may result from bearing defects can be located.

B70-10293  
NEW MODEL PERFORMANCE INDEX FOR ENGINEERING  
DESIGN OF CONTROL SYSTEMS  
SPON- INNOVATOR NOT GIVEN /MIT/ DATE- MAY 1970  
HQ-10520

Performance index includes a model representing linear control-system design specifications. Based on a geometric criterion for approximation of the model by the actual system, the index can be interpreted directly in terms of the desired system response model without actually having the model's time response.

B70-10301  
TECHNIQUE FOR IMPROVING HYDRODYNAMIC GYRO BEARINGS  
BROSSARD, P., JR. BURCH, J. DATE- JUN. 1970  
M-PS-20764

Conical or spherical, spirally grooved grease bearings have an inclined surface which is machined inboard of the grooved surface. The indentation and inclined surface provide a reservoir for forced out lubricant, and when rotation begins, centrifugal force returns the lubricant to the grooved area.

B70-10307  
FLUID INJECTION DEVICE FOR HIGH-PRESSURE SYSTEMS  
COPELAND, E. J. /N. AM. ROCKWELL CORP./ WARD, J. B. DATE- JUN. 1970  
MSC-15635

Screw activated device, consisting of a compressor, shielded replaceable ampules, a multiple-element rubber gland, and a specially constructed fluid line fitting, injects measured amounts of fluids into a pressurized system. It is sturdy and easily manipulated.

B70-10309  
THEORY AND APPLICATION OF KALMAN FILTERING  
TENG, L. /SPERRY RAND CORP./ DATE- AUG. 1970  
M-PS-20491

As a unified extension of a group of related mathematical procedures, Kalman filtering is of assistance in the design of aircraft- and ground-based guidance and navigation data reduction and display systems.

B70-10350  
FLEXIBLE PROTECTION FOR METAL BELLOWS  
KIMBLE, K. G. /ANETEK/STRAZA/ DATE- SEP. 1970  
KSC-10520

RTV silicone is used with a braided wire sheath surrounding the metal bellows in fluid transfer systems. It demonstrated best overall performance in flexibility and shock absorbing tests, high temperature, low temperature, and salt spray.

B70-10352  
SINUSOIDAL-PRESSURE GENERATOR FOR TESTING DYNAMIC PRESSURE PROBES  
ENGLUND, R., JR. GEBBEN, V. D. MYLAND, T. W. DATE- AUG. 1970 REAN- SEE ALSO NASA-TM-X-1981  
LEWIS-11094

Generator can produce sinusoidal pressures at frequencies from 300 to 5000 Hz and peak-to-peak amplitudes up to 5.6 lbs/sq in. Amplitude and phase-angle measurements made at various frequencies are compared with measurements from a piezoelectric transducer mounted flush with the resonant tube wall.

B70-10388  
EFFECT OF WALL ROUGHNESS ON LIQUID OSCILLATIONS DAMPING IN RECTANGULAR TANKS  
BUGG, F. M. DATE- OCT. 1970  
M-PS-20799

Tests were conducted in two rectangular glass tanks using silicon carbide grit bonded to walls to determine effect of wall roughness for damping liquid oscillations. Tests included effects of

roughness height, roughness location, roughness at various values, amplitude decay, Reynolds number, and boundary layer thickness.

B70-10394  
HOOP RESTRAINT ON BEAM-COLUMN BEHAVIOR IN A STIFFENED CYLINDRICAL SHELL  
KINSEY, J. C. KINSEY, J. C. /N. AM. ROCKWELL CORP./ DATE- OCT. 1970  
M-PS-16172

Skin's hoop restraint is determined by treating each stringer as an independent column on an elastic foundation. The equivalent radial support is simulated by elastic supports on a beam column. The formula is given for determination of the spring rates of these supports.

B70-10395  
COMPARISON OF RELEASE TORQUES OF TIGHTENED BOLTS IN VACUUM AND AIR  
DEMAREST, K. E. DATE- SEP. 1970 REAN- SEE ALSO NASA-TM-X-53936  
M-PS-20773

Various combinations of stainless steel, mild steel, and aluminum bolt-nut couples are tightened to 60 lb-ft in partial vacuum and in air. Results are given for tests with and without two lubricants /a fluorosilicone and a sodium silicate bonded dry-film/.

B70-10398  
JETTISONING SYSTEM FOR A PARACHUTE'S CANISTER  
LONBORG, J. O. MACK, T. H. DATE- SEP. 1970  
NPO-11236

Three-point automatically released suspension and jettisoning system operates independently of lander's power system and releases parachute on touchdown. The system is based on a ball-lock device operated by the shock of the parachute's opening and by the subsequent decay in the load on the main cord.

B70-10399  
OPTIMUM STRUCTURAL DESIGN BASED ON RELIABILITY ANALYSIS  
HEER, E. SHINOZUKA, M. YANG, J. N. DATE- OCT. 1970  
NPO-11261

Proof-load test improves statistical confidence in the estimate of reliability, numerical examples indicate a definite advantage of the proof-load approach in terms of savings in structural weight. The cost of establishing the statistical distribution of strength of the structural material is also introduced into the cost formulation.

B70-10406  
EXPERIMENTAL INVESTIGATION AND ANALYSIS OF TWO SOURCES OF NOZZLE-THRUST MISALIGNMENT  
DOWDY, M. W. STRAND, L. D. DATE- SEP. 1970  
REAN- SEE ALSO NASA-CR-105905  
NPO-11355

Asymmetry of nozzle's throat produces oscillatory type net side-force axial profile. Using mean values of localized static pressure and Mach number, scaling laws for flat-plate supersonic flow over protrusion are applied to nozzle expansion cone irregularities to give approximate indication of perturbed-pressure profiles and induced side forces.

B70-10408  
NEW STRUCTURAL APPROACH FOR DETERMINING LOAD CARRYING CAPABILITY OF FILAMENT WOUND COMPOSITE MATERIALS  
ARMSTRONG, W. H. /BOEING CO./ YANG, P. B. DATE- SEP. 1970  
M-PS-15121

Metal lined boron and graphite composites exhibit high strength and minimum weight, making them superior to aluminum cylindrical shell structures and to steel or aluminum constructed pressure vessels. S glass filament-epoxy resin matrix with aluminum liner is suitable for cryogenic tanks.

B70-10411  
VEE-NOTCH TOOL CUTS SPECIMENS  
SPIER, R. A. DATE- OCT. 1970  
M-FS-20730

Triangular cutting tool uses carbide tips for notching heat-treated or abrasive materials, and alloys subjected to high structural stresses. The tool is rigidly mounted in a slot of mating contour to prevent deflection during cutting of tensile specimens. No other expensive machine equipment is required.

B70-10427  
METHOD OF STATISTICAL FILTERING  
BATTIN, R. H. /MIT/ DECKERT, J. C. FRASER, D. C. POTTER, J. E. DATE- SEP. 1970  
MSC-13493

Minimal formula for bounding the cross correlation between a random forcing function and the state error when this correlation is unknown is used in optimal linear filter theory applications. Use of the bound results in overestimation of the estimation-error covariance.

B70-10431  
ELIMINATION OF REDUNDANCY IN TELEMETERED DATA  
VU-SON, C. /BELL TELEPHONE LABS./ DATE- SEP. 1970  
HQ-10585

Procedure for estimating the intensity of a Poisson process can be readily programmed for a digital computer, and does not require an a priori probability space. Reduction of the sampling rate is possible without sacrificing significant information.

B70-10433  
DYNAMIC BALANCING OF HIGH-SPEED ROTARY MACHINERY  
BODENSIECK, E. J. /N. AM. ROCKWELL CORP./ PRONASKO, S. DATE- OCT. 1970  
HQ-10486

Rotary dynamics test facility investigates and corrects imbalances in rotary components at speeds up to 60,000 rpm. Use of a vacuum chamber eliminates the effect of windage and facilitates the chilling of test pieces.

B70-10449  
SORPTION VACUUM TRAP  
BARRINGTON, A. E. CARUSO, A. J. DATE- NOV. 1970  
ERC-90051

Modified sorption trap for use in high vacuum systems contains provisions for online regeneration of sorbent material. Trap is so constructed that it has a number of encapsulated resistance heaters and a valving and pumping device for removing gases from heated sorbing material. Excessive downtime is eliminated with this trap.

B70-10503  
NEW DATA ACQUISITION SYSTEM RECORDS BEARING MEASUREMENTS DIRECTLY  
ROSSBACH, R. J. /GE/ DATE- OCT. 1970  
LEWIS-10510

Digital data acquisition system records steady state and dynamic data of bearing and shaft displacement. Elliptical orbits formed can be reconstructed and the data reduced automatically. System also reads pressures, temperatures, flows, and torque during any one data scan.

B70-10582  
ANALYTICAL PREDICTION OF REVERSE BUCKLING PRESSURE FOR THIN SHELLS  
MARTINDALE, D. L. /AMETEK/STRAZA/ URBANAC, C. DATE- DEC. 1970 REAN- SEE ALSO NASA-TN-3212  
KSC-10515

Analytical technique is developed for prediction of reverse buckling in thin curved shells. Test data indicate technique predicts actual reverse buckling pressure within 10 percent, and should be useful for analytical prediction of reversed condition failure for problems such as explosive decomposition through vacuum failure.

B70-10598  
INTERACTION OF CRIPPLING AND TORSIONAL-FLEXURAL INSTABILITIES FOR CENTRALLY LOADED COLUMNS  
WALLS, J. C. /BROWN ENG. CO., INC./ DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-61287  
M-FS-20556

Empirical technique predicts failure loads for centrally loaded columns with thin-walled, open cross sections. Interaction of two failure modes is predicted by modification of the Johnson-Euler equation.

B70-10623  
OPTIMUM MULTI-IMPULSE RENDEZVOUS PROGRAM  
GLANDORF, D. R. /LOCKHEED ELECTRON, CO./ ONLEY, A. G. ROZENDAAL, H. L. DATE- DEC. 1970  
MSC-13139

OMIRPROGRAM determines optimal n-impulse rendezvous trajectories under the restrictions of two-body motion in free space. Lawden's primer vector theory is applied to determine optimum number of midcourse impulse applications. Global optimality is not guaranteed.

B70-10626  
TECHNIQUE FOR EVALUATING MULTIPLE PROBABILITY OCCURRENCES /TEMPO/  
MEZZACAPPA, M. A. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970  
M-FS-14333

Technique is described for adjustment of engineering response information by broadening the application of statistical subjective stimuli theory. The study is specifically concerned with a mathematical evaluation of the expected probability of relative occurrence which can be identified by comparison rating techniques.

B70-10627  
SIMPLE DATA-SMOOTHING AND NOISE-SUPPRESSION TECHNIQUE  
DUTY, R. L. /IBM/ DATE- NOV. 1970  
M-FS-20803

Algorithm, based on the Borel method of summing divergent sequences, is used for smoothing noisy data where knowledge of frequency content is not required. Technique's effectiveness is demonstrated by a series of graphs.

B70-10647  
SYSTEMS APPROACH PROVIDES MANAGEMENT CONTROL OF COMPLEX PROGRAMS  
DUDEK, E. F., JR. /N. AM. ROCKWELL CORP./ MC CARTHY, J. F., JR. DATE- DEC. 1970  
M-FS-20791

Integrated program management process provides management visual assistance through three interrelated charts - system model that identifies each function to be performed, matrix that identifies personnel responsibilities for these functions, process chart that breaks down the functions into discrete tasks.

B70-10657  
AUTOMATIC, COMPUTERIZED TESTING OF BOLTS  
CARLUCCI, J., JR. LOBB, V. B. STOLLER, F. W. DATE- DEC. 1970  
NPO-11090

System for testing bolts with various platings, lubricants, nuts, and tightening procedures tests 200 fasteners, and processes and summarizes the results, within one month. System measures input torque, nut rotation, bolt clamping force, bolt shank twist, and bolt elongation, data is printed in report form. Test apparatus is described.

B70-10695  
HYPERBOLA-GENERATOR FOR LOCATION OF APERIODIC EVENTS  
PAUCKER, H. R. SPITZER, C. R. VANN, D. S. DATE- DEC. 1970  
LANGLEY-10312

Plotting device, when used in conjunction with three or more detectors and local receiver and recorder, can quickly pinpoint location of any aperiodic event. Operation requires minimal training and is readily adapted to the field. Mechanical error in device prototype is less than

B70-10710

or equal to 3 percent.

B70-10710

A REPORT OF ADVANCEMENTS IN STRUCTURAL DYNAMIC TECHNOLOGY RESULTING FROM SATURN 5 PROGRAMS

SPON- INNOVATOR NOT GIVEN /BOEING CO./ DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-1539, NASA-CR-1540 LANGLEY-10684

Two volume report on practical aspects of structural dynamic analysis in Saturn 5 program is described. Volume 1 is oriented toward program managers of future structural dynamic programs. Volume 2, oriented toward technical leaders of programs, discusses methods and procedures used in Saturn 5 program.

B70-10712

A NEW METHOD FOR MEASURING SLIPPERINESS OF AIRPORT RUNWAYS AND OTHER PAVED SURFACES

HORNE, W. B. YAGER, T. J. DATE- DEC. 1970 LANGLEY-10795

Aircraft stopping distances on wet runways are accurately predicted by measurements taken with a conventional automobile equipped with diagonal braking system and simple instrumentation for recording stopping distances.

B70-10715

STRAIN GAGE INSTALLATION MANUAL

NICHOLS, D. W. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970 M-FS-18822

Detailed specifications for installing laboratory strain gages are compiled into handy reference manual that provides laboratory technicians with ready source of instructions on techniques and procedures for cementing a wide variety of strain gages onto most of the commonly encountered engineering materials.

B70-10725

A STUDY OF NACA AND NASA PUBLISHED INFORMATION OF PERTINENCE IN THE DESIGN OF LIGHT AIRCRAFT

SPON- INNOVATOR NOT GIVEN /N. C. STATE UNIV./ DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-1484, NASA-CR-1485, NASA-CR-1486 LANGLEY-10778

Three volume report contains NACA/NASA generated literature pertinent to the design of light aircraft. Information covers structural design, propulsion subsystems, landing gear loads, flutter, performance calculation procedures, and high horsepower propellers. Major emphasis is on reports produced prior to 1962.

## 07 MACHINERY, EQUIPMENT, AND TOOLS

B70-10014

THERMAL-DIFFERENCE COMPENSATION FOR STRUCTURAL MEMBERS

BELEW, R. R. DATE- SEP. 1970 M-FS-20433

Aluminum-thermal difference link maintains constant length of strut despite environmental temperature changes. An extension spring decreases load on the compensator drive linkage when strut is in tension, when strut is in compression, a compression spring is used. Perforated titanium outer tube exposes link to external heat.

B70-10028

HIGH PRESSURE FLOW-RATE SWITCH

GALE, G. P. DATE- JUN. 1970

NPO-10722

Flow-rate switch adjusts easily over a wide switching range and operates uniformly over many cycles. It adapts easily to control of various fluids and has the possibility of introducing multi-point switching. Novel design features include the tapered spool, balanced porting, capillary-bypass lubrication, and capillary-restriction damping.

B70-10037

ADJUSTABLE FLOW RESTRICTOR

TUFTE, R. J. /LTV AEROSPACE CORP./ DATE- SEP. 1970

MSC-13433

Flow-rate restrictor with sharp-edged threads generates turbulence in the fluid flow, providing greater pressure reduction than is possible with a smooth-walled device. It is less susceptible to clogging.

B70-10040

DRY-FRICTIONAL SHOCK ABSORBER

TENER, W. M. DATE- SEP. 1970

NPO-11212

Kinetic energy absorber that can safely decelerate a vehicle as it impacts a surface affords minimum rebound, is lightweight and compact, and needs no lubrication or hydraulic fluids.

B70-10050

GAS FLOWMETER

MORRIS, T. F. WELLS, F. E. DATE- AUG. 1970 REAN- SEE ALSO NASA-TN-D-5517

M-FS-20663

Mass flowmeter measures rates of flow of all common gases from purges and collected leaks at leak ports. Without dependence on gravity, it measures rates between 5 and 650 cc/min with pressures ranging from 0.001 to 10 to the minus thirteenth torr at temperatures between 70 and 500 degrees K.

B70-10066

SOLENOID VALVE PERFORMANCE CHARACTERISTICS STUDIED

ABE, J. T. /MCDONNELL DOUGLAS CORP./ BLACKBURN, S. DATE- AUG. 1970

M-FS-12458

Current and voltage waveforms of a solenoid coil are recorded as the valve opens and closes. Analysis of the waveforms with respect to time and the phase of the valve cycle accurately describes valve performance.

B70-10068

VIBRATION DAMPING OF MECHANICAL SEALS

HAMMOND, R. R. /N. AM. ROCKWELL CORP./ DATE- JAN. 1970

M-FS-14160

Bellows seal filled with spherical powder reacts to vibration inputs by absorbing displacement energy through inertia and friction of the particle masses acting on the inside surface of the cylinders.

B70-10072

MECHANICAL CHARACTERISTICS OF THE BOSSLER

COUPLING

BOSSLER, R. B., JR. /KAMAN CORP./ MAYERJAK, R. J. DATE- JUN. 1970 REAN- SEE ALSO NASA-CR-1241

HQ-10508

Test results indicate the Bossler coupling has unusual capability for accomodating combined axial motion, misalignment, and torque, suitability for applications requiring long life combined with reliability, lightweight, and minimal maintenance, and the ability to survive shock-torque greatly in excess of ultimate continuous torque.

B70-10077

CONTROLLED RELEASE OF FREE-FALLING TEST

MODELS

FIFE, W. J. HOLWAY, H. P. DATE- SEP. 1970

NPO-11314

Releasing device, powered by a drill motor through an adjustable speed reducer, has a spinning release head with three retractable spring-loaded fingers. The fingers are retracted by manual triggering of a cable at the motor end of the unit.

B70-10087

MAGNETIC GEAR BACKUP

SHEPKE, R. A. /GARRETT CORP./ DATE- JAN. 1970

MSC-13408

Backup clutch for magnetic gear operates only in case of slippage. Contacting a pin arrangement in the driven gear, the clutch provides extra



force for continuing output. It does not interfere with normal, noncontact action.

B70-10088

**TANDEM WHEEL DROP-LEGS FOR STANDARD TRUCK TRAILER**

CANTWELL, W. /MCDONNELL-DOUGLAS CORP./ SELSTAD, R. DATE- JUN. 1970  
M-FS-13466

Tandem wheel drop-leg device provides a semitrailer with fore and aft mobility that allows it to be moved without a prime mover. The modified drop-legs have trunnion dual wheels and an adjustable brace.

B70-10089

**PHENOLIC CUTTER FOR MACHINING FOAM INSULATION**

BLAIR, T. A. /N. AM. ROCKWELL CORP./ MILLER, A. C. PRICE, B. W. STILES, W. S. DATE- JUN. 1970  
M-FS-14170

Pre-pregged fiber glass is an efficient abrasive for machining polystyrene and polyurethane foams. It bonds easily to any cutter base made of aluminum, steel, or phenolic, is inexpensive, and is readily available.

B70-10090

**COMPACT, ELECTROMAGNETIC MULTIPLE-STREAM PUMP FOR LIQUID METALS - DESIGN CONCEPT**

DAVIS, J. P. DATE- JAN. 1970  
NPO-10755

Pump provides independent liquid-metal streams at a uniform flow rate. The toroidal magnet structure can accommodate any reasonable number of pump circuits. The power requirement is suited to the output voltage of the basic thermionic diode output.

B70-10101

**THERMOSTATIC EXPANSION VALVE IMPROVED BY DUAL PNEUMATIC MODULATION**

PRINGLE, G. /CHRYSLER CORP./ DATE- MAY 1970  
KSC-10072

Addition of a secondary pneumatic modulation input improves the standard devices used on thermostatic expansion valves. The valves normally meter incoming refrigerant flow through an orifice valve controlled by a valve-actuating diaphragm.

B70-10103

**WATER SURFACE DEPTH INSTRUMENT**

DAVIS, O. C., IV DATE- APR. 1970  
LANGLEY-10576

Measurement gage provides instant visual indication of water depth based on capillary action and light diffraction in a group of solid, highly polished polymethyl methacrylate rods. Rod lengths are adjustable to measure various water depths in any desired increments.

B70-10126

**LOW-COST ORBITING GRINDER FOR CUTTING DUCTS**

LANG, E. J. /N. AM. ROCKWELL CORP./ DATE- MAY 1970  
M-FS-20684

Low-cost, portable machine cuts ducts made from heat-treated alloys. An abrasive wheel, powered by a high-speed air motor mounted on an expandable plug against the inner wall of the duct, gives precise cutting.

B70-10144

**IMPROVED MECHANICAL REMOTE CONTROL ASSEMBLY - CONCEPT**

MATICA, S. W. /N. AM. ROCKWELL CORP./ DATE- FEB. 1970  
M-FS-16249

Remote control mechanical device is made more efficient by a twisted-ribbon shaft which moves in the casing on dumbbell rollers. Excessive friction and overstressing are eliminated.

B70-10160

**NOVEL VALVE FOR RECIPROCATING COMPRESSORS - CONCEPT**

WAGNER, C. E. /N. AM. AVIATION, INC./ DATE- APR. 1970  
MSC-15060

Thin ring valve for the inlets and exhausts of reciprocating compressors, and possibly for the inlets of internal combustion engines, encircles the cylinder and operates on the Bernoulli principle.

B70-10165

**FOUR-WAY, FULL-THROTTLING VALVE CONCEPT**

SHOCKEY, J. S. /SERV. TECHNOL. CORP./ DATE- APR. 1970

MSC-13437

Valve regulates the flow of a fluid over the limits from full flow in one direction to full flow in the opposite direction. At the midpoint valve position both flow paths are closed. Gradually increasing port size on both flow paths results in good throttling characteristics.

B70-10170

**UMBILICAL DISCONNECT ACTUATOR**

DAVIS, D. P. MC DOUGAL, A. R. DATE- APR. 1970  
NPO-11202

Contamination of sensitive equipment when squibs are fired is prevented by O-rings which retain the debris of squib discharge within the disconnect device.

B70-10171

**AN ELECTROTHERMALLY ACTUATED MICRO VALVE**

CHARLTON, K. W. SIPMAN, R. DATE- JUN. 1970  
NPO-10730

Microminiature slide action valve requires power only during actuation and can be used as an on-off or single inlet to alternately selected outlets.

B70-10176

**INVESTIGATION OF POSITIVE SHAFT SEALS**

PFOUTS, J. O. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970  
REAN- SEE ALSO NASA-CR-97143

M-FS-18589

Welded metal bellows secondary seals prevent secondary seal leakage with a minimum number of potential leak paths. High performance seal is obtained by controlling the potentially unstable seal-face movements induced by mechanical vibrations and fluid pressure pulsations.

B70-10193

**TWO-SPEED WHEEL-DRIVE SYSTEM WITHOUT LUBRICATION**

BURCH, J. L. DATE- SEP. 1970  
M-FS-20645

System based on sprockets and toothed belts provides high and low speeds in forward drive and high speed in reverse. It is inexpensive to produce and maintain, light in weight, reliable, and long-lived without lubrication.

B70-10198

**HIGH-POWERED AUTOMATIC LATCHING DEVICE**

COBIN, J. C. /N. AM. ROCKWELL CORP./ RHODES, L. L. DATE- OCT. 1970  
MSC-15474

Latches automatically lock together two remotely controlled bodies when their triggers are engaged by the docking ring of the lesser body. Latches are disengaged by manual actuation of the handle of each latch through two complete cycles. Emergency locking by manual actuation is also provided.

B70-10207

**HYDRAULIC BRAKE SAFETY VALVE**

HOBSON, Z. A. /N. AM. ROCKWELL CORP./ DATE- APR. 1970

M-FS-16444

Safety device, consisting of three separate fluid chambers, insures that two wheels of a brake system continue to function if a failure occurs.

B70-10228

**FAST-ACTING, FOUR-WAY SLIDE VALVE**

ABSALON, J. /N. AM. ROCKWELL CORP./ KIMMEL, M. DATE- APR. 1970  
M-FS-18608

Valve is insensitive to fluctuating sense pressure. It remains in full-open position until the supply pressure is removed.

B70-10244

PRECISION CONTROL SYSTEM FOR ENGINE FUEL  
HAWKINS, D. E. /N. AM. ROCKWELL CORP./ DATE-  
NOV. 1970  
NPO-12017

System controls two or more pneumatically operated metering valves from common pneumatic source without interaction between valve controls. Unit affords independent metering of liquid from single source to two concurrent applications. Calibration and testing demonstrate complete absence of interaction between valves and corresponding flow rates.

B70-10248

SELF-SEALING PROPELLANT-ACTUATED DEVICE  
ELIMINATES ATMOSPHERE CONTAMINATION  
HEINEY, O. K. DATE- JUL. 1970  
NPO-11013

Device retains internally generated combustion products by a plug which seals the barrel end after projectile ejection. Since no blast wave is produced, only the projectile can disturb the surrounding surfaces and atmosphere.

B70-10279

A LONG-LIVED PRECISION SWITCH ACTUATOR  
FOR CONTROLLING PUMP-PISTON ACTION  
DAVIS, R. R. DATE- JUL. 1970  
NPO-10757

Switch mechanism limits the stroke of the piston by stopping the piston motor drive. This allows retention of a fluid sample in an automated wet-chemical analysis system.

B70-10283

A TEMPERATURE-CONTROLLED FLUID FLOW  
REGULATOR  
TOMLINSON, L. E. /N. AM. ROCKWELL CORP./ DATE-  
AUG. 1970  
M-FS-14259

Slide-type valve, constructed of materials having different coefficients of thermal expansion, provides variable flow area as the slides move in relation to each other with temperature changes.

B70-10287

A CONCEPT FOR IMPROVING EFFICIENCY OF  
MULTISTAGE CENTRIFUGAL PUMPS  
GARDY, R. F. /N. AM. ROCKWELL CORP./ DATE- MAY  
1970  
LEWIS-10966

Multichannel impeller consists of successive stage impellers arranged concentrically without clearances between them. Reduction in friction is predicted to increase pump efficiency by 5 to 10 percent.

B70-10289

SELF-FORMING SHIM OR GASKET FOR MOUNTING  
HEAVY EQUIPMENT  
WALTER, G. W. DATE- MAY 1970  
KSC-10504

Soft, cross-serrated aluminum shims are used as mating gaskets between uneven surfaces. Under pressure, the aluminum flows to conform with surface irregularities, forming a plane of uniform bearing.

B70-10291

DEVELOPMENT OF LIGHTWEIGHT CRYOGENIC TANK  
SUPPORTS  
BARLETT, D. H. /BOEING CO./ MC GINNIS, J. C.  
DATE- MAY 1970 REAN- SEE ALSO NASA-CR-61309  
M-FS-20726

Fiber glass honeycomb conical support with integral, tapered-laminate edge members is developed for a liquid hydrogen tank. Special processing prevents collapse of the core and adds rigidity.

B70-10295

INTEGRATED TURBINE-COMPRESSOR PROVIDES AIR  
FLOW FOR COOLING  
FERRI, A. /N. Y. UNIV./ DATE- SEP. 1970  
HQ-10442

Modified supersonic turbine cycle provides cooling air to surrounding structures. Simplified mechanical design assures correct balance of air

flow, allows direct issue of cool air to the structure, and assists in matching turbine work output to work input required by the compressor.

B70-10302

VOLUMETRIC LEAK DETECTOR  
ELSER, M. J. /N. AM. ROCKWELL CORP./ DATE- MAY  
1970  
MSC-11325

Portable volumetric leak detector measures leakage in the range of 5 to 40 cc/hr. The detector, a fluid displacing apparatus, measures the leakage of gases across valve seats and checks components and systems of components independent of size in relatively short periods of time.

B70-10306

LOW HEAT-GAIN CRYOGENIC-LIQUID TRANSFER  
SYSTEM  
HOWS, G. E. /N. AM. ROCKWELL CORP./ WRIGHT, B.  
J. DATE- JUL. 1970  
MSC-15165

Cryogenic-liquid transfer system, containing a ring structure with tensioned small diameter, high strength wires, provides adequate physical support for the piping, minimizes the conductive heat paths between the piping and jacket, and allows for thermal expansion and contraction of the piping.

B70-10312

GAS TURBINE COMBUSTOR INSENSITIVE TO  
COMPRESSOR OUTLET DISTORTION  
HUMENIK, F. NORGREN, C. DATE- JUN. 1970 REAN-  
SEE ALSO NASA-TN-D-5570  
LEWIS-10286

Short-length annular combustor for turbojet engines eliminates change of exit temperature profile. Individual scoops of full annular height control air distribution so that shifts in the radial velocity profile of air entering the combustor will not affect combustion process or alter exit temperature profile.

B70-10313

UNIVERSAL ROUTER CONCEPT  
PESCH, W. A. /HAYES INTERN. CORP./ DATE- JUN.  
1970  
M-FS-20756

Portable universal router can cut holes of large diameter and irregular shapes, machine recesses, and drill holes with certain edge-distance limitations. Rectangular and round holes may be cut without a template.

B70-10320

INEXPENSIVE TAMPER PROOF SAFETY RELIEF  
VALVE  
FRANKWICH, P. A. /CATALYTIC-DOW/ DATE- AUG.  
1970  
KSC-10470

Basic relief valve has added safety relief valve capability that relieves overpressure before failure can occur. It may be installed in inaccessible areas with a high degree of reliability, constructed from a variety of materials, and adapted to the user's specific application.

B70-10322

SWIRL-CAN COMBUSTOR SEGMENT  
JONES, R. MOYER, H. NIEDZWIECKI, R. DATE- JUN.  
1970 REAN- SEE ALSO NASA-TN-D-5597  
LEWIS-11082

Combustor produces uniform circumferential and radial combustor exit temperature profiles and high combustion efficiency at high temperature loads. Absence of diluent air entry ports eliminates stress concentration points, low pressure fuel alleviates nozzle fouling, and abundant air at all burning stages reduces smoke.

B70-10339

PORTABLE VIBRATION EXCITER  
BEECHER, L. C. /BENDIX CORP./ WILLIAMS, F. T.  
DATE- SEP. 1970  
KSC-10069

Gas-driven vibration exciter produces a sinusoidal excitation function controllable in frequency and

in amplitude. It allows direct vibration testing of components under normal loads, removing the possibility of component damage due to high static pressure.

B70-10343  
LOW COST LOBED BEARING  
SCHULLER, F. T. DATE- SEP. 1970  
LEWIS-11076

Separate sectors for each lobed area of the bearing are assembled into the bearing housing individually and bolted tightly against the housing inside diameter. The center of a grinding wheel and the center of the housing are offset, resulting in the desired inner radius and tilt of the sector.

B70-10347  
LIQUID CRYOGENIC LUBRICANT  
DIETRICH, M. W. TOWNSEND, D. P. ZARETSKY, E. V.  
DATE- SEP. 1970 REAN- SEE ALSO NASA-TN-D-5566  
LEWIS-11075

Fluorinated polyethers are suitable lubricants for rolling-element bearings in cryogenic systems. Lubrication effectiveness is comparable to that of super-refined mineral oil lubricants operating at room temperature.

B70-10348  
ELECTROMECHANICAL HAND INCORPORATES TOUCH SENSORS AND TRIGGER FUNCTION  
DANE, D. H. DATE- MAY 1970  
M-FS-20812

Electromechanical hand incorporates touch sensors, concealed fingers, and a structure that allows the hand to hold a tool on a flat surface. The hands can be mounted on most types of existing manipulators either directly or by means of modified mounting brackets.

B70-10358  
TEST FIXTURE INSURES HIGH DEGREE OF ACCURACY IN FLEXURE TESTS  
DURAN, E. M. /WESTINGHOUSE ASTRONUCL. LAB./  
ELLENBURG, G. W. DATE- SEP. 1970  
NUC-10246

Modified die set improves accuracy in load application, minimizes problems of parallelism, and eliminates testing errors normally encountered during flexure tests. Test results are given for a comparison test of the old and new fixtures.

B70-10362  
SINGLE-PHASE HEAT TRANSFER IMPROVED BY HELICAL INSERTS IN TUBES  
GUTSEIN, M. U. DATE- SEP. 1970 REAN- SEE ALSO NASA-TM-X-52665  
LEWIS-11063

Helical-vane insert creates a single, well defined helical flow passage resulting in more reliable predictions and extrapolations of the thermal and hydraulic performance. Insert core houses instrumentation which does not disturb the flow.

B70-10363  
HEAT-BARRIER COATINGS FOR COMBUSTION CHAMBERS  
CARPENTER, H. W. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970  
M-FS-18618

Arc-plasma-sprayed layered coating of graded Inconel and zirconia protects film-coolant ring below injector plate of rocket engine combustion chamber. Interfacial temperature is designed for minimum buildup of stress and to avoid melting of the metal phase in the graded layers.

B70-10368  
LARGE-CAPACITY PUMP VAPORIZER FOR LIQUID HYDROGEN AND NITROGEN  
HAUSER, J. A. DATE- SEP. 1970  
M-FS-20508

Pump vaporizer system delivers 500 standard cubic feet per minute of hydrogen or nitrogen, one system delivers both gases. Vacuum-jacketed pump discharges liquid hydrogen or liquid nitrogen into vaporizing system heated by ambient air. Principal characteristics of the flow and discharge system, pump, and vaporizer are given.

B70-10389  
HYDRODYNAMIC SQUEEZE-FILM BEARINGS FOR GYROSCOPES  
CHIANG, T. /MECH. TECHNOL., INC./ SMITH, R. L.  
DATE- DEC. 1970  
M-FS-20802

Experimental tests are conducted on squeeze-film bearings by applying electricity to piezoelectric ceramics, causing vibrations at thousands or millions of Hz that are amplified and transmitted to the bearing. Rotor operation through 24,000 rpm without whirl instability proved bearing ability to support rotor weight without hydrodynamic action.

B70-10390  
FABRICATING SUBSCALE COMPONENTS FOR APPLICATION TO FULL-SCALE PARTS  
SPON- INNOVATOR NOT GIVEN /WHITTAKER CORP./ DATE- NOV. 1970  
M-FS-20805

Equipment requirements and fabrication methods required for manufacture of large cylindrical boron/epoxy shroud are based on subscale component production methods. Plywrap technique is well suited to fabrication of cylindrical shapes using composite materials. This method offers savings in time, labor, raw materials, and equipment costs.

B70-10391  
CORE DRILL\*S BIT IS REPLACEABLE WITHOUT WITHDRAWAL OF DRILL STEM - A CONCEPT  
RUSHING, F. C. /WESTINGHOUSE ELEC. CORP./ SIMON, A. B. DATE- SEP. 1970  
M-FS-20819

Drill bit is divided into several sectors. When collapsed, the outside diameter is forced down the drill stem, when it reaches bottom the sectors are forced outward and form a cutting bit. A dulled bit is retracted by reversal of this procedure.

B70-10400  
HYDRAULIC CHARACTERISTICS OF FLOW THROUGH MINIATURE SLITS  
POWELL, W. B. RIEBLING, R. W. DATE- SEP. 1970  
REAN- SEE ALSO NASA-CR-105897  
NPO-11354

Hydraulic characteristics of micro-orifices arrayed in close proximity across the face of a liquid fuel injector are studied. Effects of geometry and flow variables on discharge coefficients and flow regimes are determined, as well as visible characteristics of the emerging liquid streams.

B70-10409  
POOLPROOF QUICK-RELEASE LOCKING PIN  
NELSON, E. P. /N. AM. ROCKWELL CORP./ OTHMAN, T. E. ZMUDA, L. J. DATE- SEP. 1970  
M-FS-18495

Locking pin can be withdrawn only when stress on the joint is negligible. Pin consists of a forward-pointing sleeve, a spring-loaded sliding handle, and a sliding plunger. Plunger movement controls installation and withdrawal of pin.

B70-10416  
SMALL HYDRAULIC TURBINE DRIVES  
ROSTAFINSKI, W. DATE- OCT. 1970 REAN- SEE ALSO NASA-TM-X-52661  
LEWIS-11064

Turbine, driven by the fluid being pumped, requires no external controls, is completely integrated into the flow system, and has bearings which utilize the main fluid for lubrication and cooling. Torque capabilities compare favorably with those developed by positive displacement hydraulic motors.

B70-10418  
X-CONNECTORS FOR TUBING - FEASIBILITY STUDY  
BRAGG, K. /PARKER AIRCRAFT CO./ FUHRMANN, H. W.  
DATE- OCT. 1970 REAN- SEE ALSO NASA-CR-93923  
M-FS-20827

Connector tests, including 70 deg F leakage and vibration, proof pressure, burst pressure, tensility, thermal shock, high and low temperature

leakage, and simultaneous high temperature vibration and leakage, prove feasibility of lightweight 0.5-in. X-connectors for 4500-lb/sq in. service pressures.

## B70-10424

## MOLECULAR SIEVES CONTROL CONTAMINATION AND INSULATE IN THERMAL REGENERATORS - A CONCEPT

GASSER, M. G. DATE- OCT. 1970  
GSFC-10910

Zeolitic molecular sieves prolong the lives of cryogenic engines by preventing contamination of the thermal regenerators on the cold ends of closed-cycle engines. Sieves also serve as thermal insulators by preventing conduction of heat along regenerators through contiguous disks of mesh.

## B70-10455

## ACCURATE REASSEMBLY OF SMALL BROKEN TEST SPECIMENS

PARDOE, A. R. /N. AM. ROCKWELL CORP./ PELLETT, H. E. DATE- SEP. 1970  
M-PS-16730

Collets hold specimen in place while epoxy resin cements the broken ends, thereby eliminating relative rotation of the fracture faces. The cemented fracture can then be sectioned metallographically.

## B70-10465

## FLEXIBLE OR RIGID EXTENDING ARM

SIEBERT, C. J. /MARTIN MARIETTA CORP./ DATE- SEP. 1970  
MSC-13512

One motion of a manual clamp makes a universally flexible arm instantly rigid in any configuration. Device is locked rigid by meshing of gear teeth, providing great resistance to loading.

## B70-10468

## DRILLED BALL BEARINGS - AN APPROACH TO EXTENDING BEARING FATIGUE LIFE AT HIGH SPEEDS

ANDERSON, W. J. COE, H. H. DATE- SEP. 1970  
REAN- SEE ALSO NASA-TM-X-52747  
LEWIS-10856

Reducing the mass of the rolling elements in ball bearings causes a reduction of centrifugal forces and thereby extends bearing fatigue life. Ball mass is reduced by drilling a concentric hole through each ball. Concentricity and finish of the drilled hole can be closely controlled and the balls accurately balanced.

## B70-10502

## VOLUME-CHECKING TOOL

ERBE, C. J. /IBM/ POULOS, L. J. DATE- SEP. 1970  
KSC-10514

Tool, consisting of a graduated storage vessel and a control panel, can determine the amount of gas entrained by fluid in a closed system, the amount of fluid remaining in a dried system of known volume, or the volume of a container of unknown size.

## B70-10509

## EASY INSERT, EASY RELEASE TOGGLE BOLT FASTENER

KUBOKAWA, C. C. DATE- DEC. 1970  
ARC-10140

Releasable pin-type toggle bolt fastener is constructed so that, when positioned in hole, toggle action prevents its removal and locknut anchors it firmly in place. Fastener is easily removed by loosening locknut and retraction of toggle wings.

## B70-10516

## CONCEPT FOR A GAS OPERATED ACTUATOR

AMBRUSO, A. /BECKMAN INSTR. INC./ DATE- SEP. 1970  
NPO-11340

Palladium valve, permeable to hydrogen gas, is used to fill a bellows mechanism from a source of hydrogen to power an actuator. A similar valve provides retraction. The valves have no moving parts and are heat operated. One limitation on

the use of this actuator is discussed.

## B70-10517

## BISTABLE FLUIDIC VALVE IS ELECTRICALLY SWITCHED

FIET, O. O. /TRW SYSTEMS GROUP/ SALVINSKI, R. J. DATE- NOV. 1970  
NPO-10416

Bistable control valve is selectively switched by direct application of an electrical field to divert fluid from one output channel to another. Valve is inexpensive, has no moving parts, and operates on fluids which are relatively poor electrical conductors.

## B70-10523

## COMPRESSION SPRINGS USED FOR VIBRATION ISOLATION

NORMAN, R. M. DATE- OCT. 1970  
NPO-11012

System that employs opposed pairs of compression springs can be totally compressed to provide a \*\*hard mount\*\* during component installation and adjustment, and can be released to a free-floating condition for vibration isolation during test.

## B70-10526

## STANDARDS FOR MATERIAL HANDLING AND FACILITIES EQUIPMENT PROOFLOAD TESTING

BONN, S. P. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970  
MSC-15788

Document provides information on verifying the safety of material handling and facilities equipment /MH/FE/, ranging from monorail systems to ladders and non-powered mobile equipment. Seven categories of MH/FE equipment are defined.

## B70-10535

## SIMPLE TECHNIQUE EXTENDS LIFE OF ANGULAR-CONTACT BALL BEARINGS

ZARETSKY, E. V. DATE- OCT. 1970  
LEWIS-11117

Split ring, angular-contact bearing has only one ball path on the inner race and the outer race. Upon failure of either races or balls, bearing is reversed in its housing so that force is applied to opposite points on the races and bearing operation is unaffected by previous failure.

## B70-10542

## SUPPORT FOR EQUIPMENT - QUICK MOUNTING WITH QUICK RELEASE

CHAMBERLAIN, W. W., II /N. AM. ROCKWELL CORP./ JACOBSON, H. B. DATE- NOV. 1970  
MSC-15874

Temporary support device for equipment consists of pin bracket for attachment to item and socket bracket for mounting on any structure. System is adaptable to broad range of temporary storage media. No engagement, release, or adjustment of components is required.

## B70-10543

## EASY MANUAL OPERATION OF OVERHEAD GARAGE DOORS - A CONCEPT

FULLER, C. J. /BOEING CO./ DATE- NOV. 1970  
REAN- SEE ALSO B67-10611  
KSC-10555

Manually actuated mechanical device easily raises or lowers two-section overhead garage door. Rolamite principle is used to provide controlled but varying rate of ascent or descent. Device is applicable where vertical shielding or baffling needs to be raised or lowered.

## B70-10547

## ADJUSTABLE DRILL BAR REPLACES COMPLEX JIGS

COVENTRY, J. H. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970  
MSC-15624

Adjustable drill bar incorporates a micrometer screw which, when used in conjunction with standard gage blocks, provides rapid method of drill hole location and reduces time and skill requirements for precision drilling on large surfaces. Device picks up oddly dimensioned tool hole points and acts as sine drill bar.

B70-10548

# REPLACEABLE FILTERS AND CONES FOR FLARED-TUBING CONNECTORS

GRANT, L. E. /N. AM. ROCKWELL CORP./ HOWLAND, B.  
T. DATE- NOV. 1970  
MSC-15750

Connector is modified by machining the cone from one end before the fitting is bored to accommodate a metallic-filament type of slip-in filter. Thus, when surface of the cone is damaged, only the cone needs replacement.

B70-10550

# SPECIAL WRENCH FOR B-NUTS REDUCES TORQUE STRESS IN TUBING

STEIN, J. A. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970

MSC-15885

Gear-driven torque wrench with bearing support is used to tighten B-nut connection of partially supported fluid line with minimum stress to adjacent tubing and fittings. Wrench is useful for working with weak or brittle lines such as glass tubing.

B70-10558

# PILOT-BOOSTER CONTROL VALVE

MARLEY, D. /PARKER-HANNIFIN CORP./ DATE- NOV. 1970

M-FS-20635

Two-stage, pressure-sensing control valve is designed for servocontrol of 10-inch main tank valve regulating pressure of liquid oxygen in tank and serving to vent tank during filling. Valve uses a negative-rate Belleville spring to cancel positive spring rates of bellows and coil springs.

B70-10559

# SAFE SUSPENSION OF SPECIMENS OR CLUSTERS DURING DYNAMIC TESTING - A CONCEPT

HOCH, G. C. /BOEING CO./ RUSSELL, J. B. DATE- DEC. 1970

M-FS-15110

Support system without point supports permits dynamic testing of complex or delicate mechanical units without excessive movement which might cause damage. Motion-sensor pressure-control system regulates inflation of molded rubber bags surrounding test specimen, so that any excessive motion is smothered until test is terminated.

B70-10566

# ELECTROTHERMAL FRACTURING OF TENSILE SPECIMENS

BLINN, H. O. /WESTINGHOUSE ASTRONUCL. LAB./  
HANKS, J. G. PERKINS, H. P. DATE- DEC. 1970  
NUC-10185

Pulling device consisting of structural tube, connecting rod, spring-loaded nuts, loading rod, heating element, and three bulkheads fractures tensile specimens. Alternate heating and cooling increases tensile loading by increments until fracturing occurs. Load cell or strain gage, applied to pulling rod, determines forces applied.

B70-10567

# THREE-DIMENSIONAL PANTOGRAPH FOR USE IN HAZARDOUS ENVIRONMENTS

COWFER, C. D. /WESTINGHOUSE ELEC. CORP./ WAGNER, H. A. DATE- NOV. 1970

NUC-10222

Material measurement device is used with radioactive probes which can be approached only to distance of 3 feet. Tracer-following unit is capable of precisely controlled movement in X-Y-Z planes. Pantograph is usable in industrial processes involving chemical corrosives, poisons, and bacteriological hazards, as well as nuclear applications.

B70-10577

# FLEXIBLE PIVOT MOUNT ELIMINATES FRICTION AND HYSTERESIS

HIGHMAN, C. O. /BALL BROTHERS RES. CORP./ DATE- NOV. 1970

M-FS-20725

Flexible steel pivot mount, suspended by flat vertical beryllium copper springs, is capable of rotation, free of hysteresis and starting

friction. Mount requires no lubrication, is made in varying sizes, and is driven with either dc torque motor or mechanical linkage.

B70-10583

# IMPROVED BURST DISK/CUTTER ASSEMBLY

MARTINEZ, J. /AMETEK/STRAZA/ DATE- DEC. 1970  
REAN- SEE ALSO B70-10582

KSC-10516

Burst disk/cutter, prewelded before assembly, eliminates external leakage into a vacuum annulus and provides a means for more accurate burst-pressure prediction. Two reverse buckling type configurations are described and test results are given.

B70-10586

# DEADWEIGHT CALIBRATION OF PRESSURE GAGES WITHOUT CONTAMINATION

HENSLEY, D. R. /N. AM. ROCKWELL CORP./ DATE- NOV. 1970

M-FS-18690

Calibration of pressure gages is accomplished by use of fluid chamber in conjunction with conventional single chamber hydraulic deadweight tester. System eliminates cleaning of gages with liquid oxygen after tests and is simple to construct and operate.

B70-10589

# BIDIRECTIONAL FLOW METER

SUTTON, R. F. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970

M-FS-18737

Device provides wide variety of flow metering on a volume demand basis, in either of two directions. Flow is controlled by number, locations, and sizes of orifices and O-rings. Device is useful in pneumatic or hydraulic systems where valve sequence and timing functions vary from point to point.

B70-10595

# EFFICIENT PRESSURE-TRANSFORMER FOR FLUIDS

MORANDO, J. A. /CRANE CO./ DATE- DEC. 1970

M-FS-20830

Fluid transformer utilizes fluid under pressure at one level to drive series of free pistons in positive displacement pump. Pump in turn delivers hydraulic fluid at different pressure level to a load. Transformer is constructed of corrosion resistant materials and is extremely light and compact in relation to capacity.

B70-10609

# TFE COATING EXTENDS LIFE OF FLEXIBLE METAL COMPRESSOR DIAPHRAGM

GORLAND, S. DATE- NOV. 1970

LEWIS-11113

Tetrafluoroethylene /TFE/ aerosol sprayed onto entire surface of diaphragm acts as film lubricant and permits diaphragm to slide between upper and lower plates in a reciprocating compressor. Flexing occurs over an area rather than about a single line of action and operating life of diaphragm is more than quadrupled.

B70-10610

# HYDROGEN-OXYGEN POWERED INTERNAL COMBUSTION ENGINE

CAMERON, H. /VICKERS, INC./ MORGAN, N. DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-255

LEWIS-90264

Hydrogen at 300 psi and oxygen at 800 psi are injected sequentially into the combustion chamber to form hydrogen-rich mixture. This mode of injection eliminates difficulties of preignition, detonation, etc., encountered with carburated, spark-ignited, hydrogen-air mixtures. Ignition at startup is by means of a palladium catalyst.

B70-10635

# HIGH AMPLITUDE SINUSOIDAL PRESSURE GENERATOR

ROBINSON, R. E. /BATTELLE MEM. INST./ DATE- NOV. 1970 REAN- SEE ALSO NASA-CR-72656, B66-10031

LEWIS-11241

Generator is an inlet-area-modulated, gas-flow-through device utilizing hydrogen gas and a rotating disk for operation. Design enables

B70-10636

generator to produce pressure oscillations as high as 120, 18, and 12 percent of the mean chamber pressure at frequencies of 1, 10, and 15 kHz, respectively.

B70-10636

ADJUSTABLE SUPPORT SPRING  
HADLAND, W. O. DATE- DEC. 1970  
ARC-10203

Restraining spring mechanism acting against a force has adjustable spring constant, and its performance is not affected by changes in ambient pressure. Natural frequency of device is varied by changing absolute pressures within bellows and may be tuned to prevent coupling while maintaining a given spring constant.

B70-10640

LOW-NOISE FLOW VALVE FOR AIR DUCTS  
GALLO, E. A. /SERV. TECHNOL. CORP./ DATE- DEC. 1970  
MSC-13441

Valve assembly controls air flow from feeder into main duct, with minimum of turbulence, friction, pressure differential, and noise. Valve consists of damper, deflector, and spring. Streamlining of damper and deflector merges flow smoothly, while spring keeps damper and deflector in contact and eliminates valve chatter and damping vibrations.

B70-10652

CONTROLLED DROPLET SPRAY GENERATOR  
NICHOLLS, J. A. /MICH. UNIV./ DATE- DEC. 1970  
REAN- SEE ALSO NASA-CR-72668  
LEWIS-11193

Spray generator produces streams of uniform-size droplets issuing at uniform rate by applying an oscillatory disturbance to free liquid jets. Jets of varying diameters can be grouped together and oscillated as a group to produce simultaneous streams of uniform-size droplets.

B70-10653

LONG LIFE, LOW COST BALL VALVE, WITH LIFTED SEALS AND CARTRIDGE TYPE CONSTRUCTION  
CARRIKER, J. W. /AEROJET-GEN. CORP./ PIEWEGER, R. DATE- DEC. 1970  
MSC-13430

Ball valve design incorporates modular construction in easy-to-install, easy-to-replace cartridge housing, and a system of cams to lift upstream and downstream seals away from the ball during rotation. Tests conducted on nitrogen tetroxide prove new valve to be more efficient than previous models in preventing leakage.

B70-10668

METHOD OF STABILIZING FLUERIC VORTEX VALVES AND VORTEX AMPLIFIERS  
ERWIN, L. R. /BENDIX CORP./ MC FALL, R. H. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72423  
LEWIS-10553

Inducing losses in the vortex chamber of vortex valves and vortex amplifiers resolves the problem of unstable operation caused by a sufficiently large positive feedback. Induced losses also reduce pressure gain and throttling range of vortex pressure amplifier.

B70-10671

TWIN-SPOOL TURBOPUMPS FOR \*\*LOW\*\* NET POSITIVE SUCTION PRESSURE OPERATIONS  
BAIR, E. K. /AEROJET-GEN. CORP./ CAMPBELL, W. E. FORD, O. I. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72540  
LEWIS-11105

Modified single-shaft turbopump incorporates inducer and main pump, each separately driven at different speeds through coaxial-shaft arrangement. Inducer operates at low speed for low net positive suction pressure, main pump operates at high speed to generate high pressure. This arrangement requires no external control for the inducer.

B70-10679

COMPACT FLUID-FLOW RESTRICTOR  
SHEREE, R. W. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970

MSC-15803

Fluid-flow restrictor has degree of restriction easily and accurately controlled during manufacture. Restrictor's flow channel is machined square thread around a solid slug which is shrink-fitted to cylindrical case. One end of case is closed, open end capped, and both ends tapped for tube fittings for fluid flow.

B70-10688

LOW LEAK RATE POPPET-AND-SEAT CHECK VALVE  
WHITTEN, D. E. /BENDIX CORP./ DATE- DEC. 1970  
MSC-13587

Valve leakage due to contaminant entrapment and chattering is effectively minimized by a metallic poppet-and-seat check valve designed for use in extreme environmental and fluid temperature conditions.

B70-10692

RESONANT SYSTEMS FOR DYNAMIC EVALUATION OF PRESSURE TRANSDUCERS  
LIU, C. Y. /BATTELLE MEM. INST./ ROBINSON, R. E. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72435  
HQ-10609

Tests were conducted with contrived inlet modulated sinusoidal pressure generator to study possible use in calibrating pressure sensors. Results indicate concept is feasible and applicable to transducer evaluation.

B70-10699

SELF-SEALING, EASILY PURGED QUICK-DISCONNECT HOSE COUPLING  
LEYERLE, R. B. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970  
MSC-17009

Coupling for pressurized hoses handles gas or liquid, is easily purged, and automatically seals the hose when disconnected. Volatile or toxic materials can be isolated before the connection is broken. This device may interest food processors and manufacturers of fluid delivery systems.

B70-10701

STARTER PROPELLANTS AND AUXILIARY GENERATORS FOR GAS TURBINES  
GILL, G. S. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970  
M-FS-18813

Study relates geometry of an internally burning, single, solid-propellant grain to propellant characteristics, engine requirements, and selected starting pressure. Study derives curves for selecting propellants to meet specific engine requirements, or for tailoring engine requirements to propellant limitations.

B70-10714

CARRIAGE-RAIL ASSEMBLY FOR HIGH-RESOLUTION MECHANICAL POSITIONING  
BOSWORTH, R. H. /BENDIX CORP./ RONEY, B. W. DATE- DEC. 1970  
M-FS-20908

Carriage-rail assembly effects extreme resolution and position accuracy with little friction, and is applicable to such apparatus as optical benches, inspection fixtures, machine tools, and photographic equipment. Directions for assembly construction are given.

B70-10728

ABSOLUTE FOCUS LOCK FOR MICROSCOPES  
CONE, C. D., JR. LOOP, R. W. TONGIER, M., JR. DATE- DEC. 1970  
LANGLEY-10184

Mechanism absolutely immobilizes microscope stage at a preset focus, preserving focus indefinitely. The lock is a second-class lever consisting of a straight body having a fulcrum with a cylindrical bearing surface at one end and a thumbscrew at the other end.

## 08 FABRICATION TECHNOLOGY

B70-10015

MEASURING THE CONDUCTOR SPACING IN FLAT  
CONDUCTOR CABLESANGELE, W. DATE- AUG. 1970 REAN- SEE ALSO  
NASA-TM-X-53843

M-FS-20560

Interference method produces a moire pattern having a shape correlated with the lead spacing. A continuous check of the spacing is possible if the material between the leads is translucent. Technique is quick, accurate, convenient, and simple to operate.

B70-10019

USE OF ACRYLIC SHEET MOLDS FOR ELASTOMERIC  
PRODUCTSHEISMAN, R. M. /N. AM. ROCKWELL CORP./ KOERNER,  
A. E. MESSINEO, S. M. DATE- JUN. 1970

MSC-15636

Molds constructed of acrylic sheet are more easily machined than metal, are transparent to ensure complete filling during injection, and have smooth surfaces free of contamination. Technique eliminates flashing on molded parts and mold release agents.

B70-10038

## SPLIT RADIUS-FORM BLOCKS FOR TUBE BENDERS

LANGE, D. R. /N. AM. ROCKWELL CORP./ SEIPLE, C.  
W. DATE- MAY 1970

MSC-15773

Two-piece, radius-form block permits accurate forming and removing of parts with more than a 180 degree bend. Tube bender can shape flexible metal tubing in applications dealing with plumbing, heating, and pressure transmission lines.

B70-10041

## SPINARC GAS TUNGSTEN ARC TORCH HOLDER

BRACE, D. F. /N. AM. ROCKWELL CORP./ CROCKETT,  
J. L. DATE- AUG. 1970

MSC-15646

Semiautomatic welding torch enables operator to control arc length, torch angle, and spring tension when welding small diameter aluminum tubing. Tungsten is preset for the weld to make arc initiation easier and to eliminate searching for the joint through a dark welding lens.

B70-10044

MODIFIED FACEPLATE ASSEMBLY FOR  
STUD-WELDING GUNJOHNSON, R. E. /N. AM. ROCKWELL CORP./ DATE-  
JUL. 1970

M-FS-16725

Ventilated barrel assembly aids installation of studs on narrow uneven weld lands. The modified faceplate permits proper aligning of the percussion stud-welding gun in any position and on a smaller surface, and it maintains gap setting without any other adjustment.

B70-10120

## SALVAGING SURFACE-DAMAGED ALUMINUM CASTINGS

HANNA, T. L. /N. AM. ROCKWELL CORP./ DATE- MAY  
1970

M-FS-18789

Repair operation for damaged aluminum parts includes anodizing the part, removing the oxide layer, filling the pit or scratch with copper, capping the fill with cadmium, and hand polishing.

B70-10121

A METHOD FOR OBTAINING HIGH DUCTILITY IN  
CRITICAL AREAS OF ALUMINUM CASTINGSSTRANGELAND, M. L. ZUECH, R. A. /N. AM. ROCKWELL  
CORP./ DATE- APR. 1970

M-FS-18705

Wrought aluminum alloys provide high-strength substitute in the damaged area of aluminum castings. The segment can either be welded to the cast alloy or built in with a heat-treatable welding rod.

B70-10127

## IMPROVED ELECTRON-BEAM WELDING TECHNIQUE

SCHUMACHER, B. /WESTINGHOUSE ELEC. CORP./ DATE-  
JUN. 1970

M-FS-20714

Electron-beam generator produces high quality welds without vaporization by relying on the mobility and hydrodynamic properties of the material in its liquid phase. The power density of the beam is relative to the speed of the workpiece, producing an inclined weld-front.

B70-10136

## BUTT WELDER FOR FINE GAGE WIRE

KABANA, W. B. DATE- AUG. 1970  
LANGLEY-10103

Device welds fine gage wire 0.001-in. in diameter. It permits welding of thermocouple junctions of the same size with straight sections adjacent to the junctions. Electrode arrangement provides constant pressure on the joint during welding while fully supporting the wires to prevent buckling or movement.

B70-10155

## APPLICATIONS OF GAP WELDING

ADAMS, G. D. DATE- AUG. 1970

M-FS-20715

Gap welding of electronic interconnections yields high strength joints, is easy to use, and allows visual inspection of the welding process. It is easily adaptable to automated circuit assembly.

B70-10194

## INTERMOLECULAR BONDING OF METALS OR ALLOYS

## BY THERMOCHEMICAL DECOMPOSITION

WILSON, R. /MARTIN-MARIETTA CORP./ DATE- JUN.  
1970 REAN- SEE ALSO NASA-CR-80721

M-FS-13823

Various metals and alloys are bonded at temperatures below their recrystallization temperature with a Ni-Fe-C alloy grown by thermochemical vapor deposition from organometallic plating compounds. Process time is short, the joints are strong, and microthrowing power is good.

B70-10202

## SURFACE TREATMENT FOR VALVE SEATS

MAC GLASHAN, W. F., JR. DATE- SEP. 1970  
NPO-10779

Valve with embedded fine particles of diamond in the metal surface of the valve seat resists galling, corrosion, erosion, and cold welding. Diamond powder has an average particle diameter of 0.01 micron and is used with a standard fine diamond polishing compound.

B70-10215

## INORGANIC BONDING OF SEMICONDUCTOR STRAIN

## GAGES

WOODRUFF, N. L. /KULITE SEMICONDUCTOR PROD.,  
INC./ DATE- JUL. 1970 REAN- SEE ALSO

NASA-CR-100015

GSFC-10833

Inorganic bonding materials minimize outgassing and improve electrical and mechanical properties of semiconductor strain-gage transducers in high-vacuum and high-temperature operations. The two basic methods described are ceramic-glass-bonding and metallic bond formation between the strain gage and the substrate.

B70-10241

PREVENTION OF CRACKING OF SOLDERED JOINTS  
IN ELECTRONIC ASSEMBLIES

BEASLEY, B. DATE- AUG. 1970

M-FS-20544

Printed circuit board design allows for thermal stressing of the soldered joints during many thermal cycles. Components\* leads should be cleaned, tinned, and freed of particles that prevent solder adherence, have a thin conformal coating, and have an air space between the coating and the body of the component.

B70-10331

FABRICATION OF HOLLOW BALL BEARINGS BY  
DIFFUSION WELDING

MOORE, T. J. DATE- JUN. 1970

LEWIS-11026

Two steel hemispheres are diffusion welded in an atmosphere of 0.00002 torr at a temperature of

2130 degrees F for 4 hours with a pressure of 4 psi holding the hemispheres together. Weld is accomplished with only microdeformation.

## B70-10342

## FIBERGLASS HONEYCOMB ELEMENTS FORMED QUICKLY AND CHEAPLY

SMITH, R. H. /NORTHROP CORP./ DATE- AUG. 1970  
REAN- SEE ALSO NASA-CR-66301  
LANGLEY-10125

Cookie cutter device initiates production of identical, double-contoured fiber glass elements used as shock absorbers. Three-bladed edges convert triangular honeycomb elements into hexagonal shapes which are then stamped to desired length by concave and convex dies. Sandpaper smoothing completes the process.

## B70-10367

## IMPROVED WELDING OF RENE-41

NUNEZ, S. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970

M-FS-18821

Gas-tungsten arc welding with a filler of Rene-41 produces strong welded joints. When Rene-41 is used, resistance to strain-age cracking is greatly increased by post-weld solution annealing in an inert atmosphere. Mechanical properties of Rene-41 and Hastelloy-W are compared.

## B70-10397

## NONDESTRUCTIVE SONIC TESTING OF ADHESIVE-BONDED COMPOSITES

CAUSTIN, E. L. /N. AM. ROCKWELL CORP./ DATE- OCT. 1970 REAN- SEE ALSO B69-10366

M-FS-20793

System detects and determines the location, depth, and areas of crushed core or of breaks in bonding between core and adhesive, adhesive and face sheet, or face sheet and external doubler. It is applicable to honeycomb panels of metal and/or plastics and to metal-to-metal laminates.

## B70-10412

## IMPROVED ELECTRON BEAM WELDING TECHNIQUE

SCHUMAKER, B. W. /WESTINGHOUSE ELEC./ DATE- SEP. 1970

M-FS-20753

Energy transferred from the source to the workpiece is maximized by relying on the mobility of the material in its liquid phase. This permits more beam energy to transfer to the weld front.

## B70-10417

## TESTING OF BRAZED AND WELDED CONNECTIONS OF STAINLESS-STEEL TUBING

CAHILL, J. B. /BROWN ENG. CO./ DATE- SEP. 1970  
REAN- SEE ALSO NASA-CR-61310

M-FS-20806

Test procedures and results are given for three types of semipermanent sleeve-type connections for stainless-steel tubing. Subject to the limited resistances to corrosion and vibration, all three types are found to be suitable for extremes in reliability and environment, if given close control during manufacture.

## B70-10428

## HIGH-TEMPERATURE \*\*HYDROSTATIC\*\* EXTRUSION

HUNT, J. G. /NUCL. METALS, INC./ RICE, R. W. /BOEING CO./ DATE- SEP. 1970

NPO-10811

Quasi-fluids permit hydrostatic extrusion of solid materials. The use of sodium chloride, calcium fluoride, or glasses as quasi-fluids reduces handling, corrosion, and sealing problems, these materials successfully extrude steel, molybdenum, ceramics, calcium carbonate, and calcium oxide. This technique also permits fluid-to-fluid extrusion.

## B70-10429

## HIGH EXPANSION COEFFICIENT GLASSES CAN BE SEALED TO COMMON METALS

CAMP, F. E. /WESTINGHOUSE ELEC. CORP./ CHAMPMAN, J. W. HIRAYAMA, C. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72520

LEWIS-10698

New series of high expansion coefficient glasses

can be sealed by fusion onto hot surfaces of metals and alloys. Glasses have relatively low working temperatures, good chemical durability, and can be used in electrical insulators and feedthroughs to fluid or vacuum systems.

## B70-10430

## HIGH TEMPERATURE GLASS COATINGS FOR SUPERALLOYS AND REFRACTORY METALS

CHAPMAN, J. W. /WESTINGHOUSE ELEC. CORP./ GREKILA, R. B. HIRAYAMA, C. MATTOX, D. M. DATE- DEC. 1970 REAN- SEE ALSO NASA-CR-72520  
LEWIS-10700

New glasses are used as protective coatings on metals and alloys susceptible to oxidation at high temperatures in oxidizing atmospheres. Glasses are stable and solid at temperatures up to 1000 deg C, adhere well to metal surfaces, and are usable for metals with broad range of expansion coefficients.

## B70-10466

## NONDESTRUCTIVE ASSESSMENT OF PENETRATION OF ELECTRON-BEAM WELDS

HARMON, T. J. /N. AM. ROCKWELL CORP./ HILLMAN, J. L. YOST, M. C. DATE- SEP. 1970  
MSC-15955

Empirical method correlates penetration of an electron-beam weld with external measurements of the weld. Empirical polygon accurately confirms full-penetration welds while a second, larger polygon provides for penetration of welds near the tip.

## B70-10489

## IMPROVED REINFORCEMENT FOR OPENINGS IN DIFFICULT FABRICS

BESSETTE, R. J. /ILC IND., INC./ DATE- SEP. 1970  
MSC-13554

Plastic film is applied to each side of the fabric and the two films are then fused together with conventional heat-sealing equipment. With the inner area of the fabric cut away, a flexible, sturdy band of material is left around the opening with no raw edges.

## B70-10512

## MOLDING PROCEDURE FOR CASTING A VARIETY OF ALLOYS

FONTES, M. J. KOURTIDES, D. LEIBFRITZ, E. R. DATE- DEC. 1970

ARC-10358

General procedure and molding sand composition for preparing molds usable for casting variety of alloys are developed. Molds are prepared from mixture of sand, sodium silicate binder, and organic liquid ester. Castings of radiographic quality are produced from various alloys.

## B70-10513

## SYNTHESIS OF DIAMONDS

ESTES, M. F. RASQUIN, J. R. DATE- SEP. 1970  
M-FS-20698

Shock wave transmitted through a solid exponential horn generates heat and pressure to convert part of a charge of graphite to diamonds. The shock wave is generated in the apparatus by a complex of magnetic fields and eddy currents.

## B70-10514

## ULTRASONIC DETECTION OF FLAWS IN FUSION BUTT WELDS

CROSS, B. T. /AUTOMATION IND., INC./ HANNA, K. J. TOOLEY, W. M. DATE- SEP. 1970 REAN- SEE ALSO NASA-CR-61952

M-FS-20824 M-FS-20843

Reliable and accurate Delta technique, a nondestructive ultrasonics method, uses redirection of energy to detect randomly oriented imperfections in fusion butt welds. Data on flaws can be read from either an oscilloscope or a printout.

## B70-10537

## HIGH-TEMPERATURE NICKEL-BRAZING ALLOY

POWELL, A. H. /GE/ THOMPSON, S. R. DATE- OCT. 1970

LEWIS-10928

Gold-nickel brazing alloy, with 5 percent indium



added to depress the melting point, is used for brazing of nickel-clad silver electrical conductors which operate at temperatures to 1200 deg F. Alloy has low resistivity, requires no flux, and is less corrosive than other gold-nickel, gold-copper alloys.

B70-10544

IMPROVED HEAT-RESISTANT GARMENTS

JOHNSTON, R. S. DATE- DEC. 1970

MSC-12109

Fabrication method for protective clothing eliminates the common heat-short by avoiding the stitch which is common to all layers, and preventing external exposure of any stitch to the outer environment. A unique overlap arrangement is described and additional protective methods are discussed.

B70-10580

SIMPLE BONDING TECHNIQUE FOR HIGH-TEMPERATURE CERAMIC COATINGS

ACCONTIUS, O. E. /N. AM. ROCKWELL CORP./

CARPENTER, H. W. ONODA, G. Y., JR. DATE- NOV.

1970 REAN- SEE ALSO NASA-CR-72569

LEWIS-11085

Coatings, consisting of zirconia powder bonded with orthophosphoric acid and a small amount of hydrofluoric acid, are hard, strong, and refractory, resist thermal shock, and provide good thermal protection. After the aqueous coating is applied to a metallic surface, only a 600 deg F cure is required before service.

B70-10594

METAL DRILLING WITH PORTABLE HAND DRILLS

EDMISTON, W. B. /BOEING CO./ HARRISON, H. W.

MORRIS, H. E. DATE- DEC. 1970

M-FS-15180

Study of metal drilling solves problems of excessive burring, oversized holes, and out-of-round holes. Recommendations deal with using the proper chemical coolants, applying the coolants effectively, employing cutting oils, and dissipating the heat caused by drilling.

B70-10604

FILLER-WIRE POSITIONER FOR ELECTRON BEAM

WELDING

BEAUPRE, W. M. /N. AM. ROCKWELL CORP./ FUEG, L.

B. PHILLIPS, J. A. DATE- NOV. 1970

MSC-15637

Miniaturized positioner is installed in any electron beam vacuum chamber for use with wire feed applications requiring filler wire. Horizontal and vertical control of the positioner is maintained from a console while chamber is under vacuum. Device permits more positive positioning of welding filler wire.

B70-10624

REPAIR OF BRAZED STEEL HONEYCOMB-SANDWICH

PANELS WITH VERTICAL PINS ONLY

ROWE, J. /N. AM. ROCKWELL CORP./ DATE- DEC. 1970

MSC-15831

Vertical steel tubular pins restore the shear strength of honeycomb panels and improve the quality of the repaired panel. New repair method eliminates diagonal pins. Vertical pins are welded to face sheets, forming \*\*Vierendeel Truss\*\* arrangement to transmit shear loads.

B70-10654

HOLOGRAPHIC ANALYSIS OF THIN FILMS

NORDEN, B. N. WILLIAMS, J. R. DATE- DEC. 1970

M-FS-20823

Technique for monitoring deposition of films on surfaces, in place on a real-time basis, reads both the thickness and the uniformity of the deposited film. Holograms are produced from both reflected and transmitted light on one plate.

B70-10663

IMPROVEMENT OF ADHESIVE-BONDED STRUCTURAL

JOINTS

EVENSEN, H. A. /WHITTAKER CORP./ DATE- DEC. 1970

REAN- SEE ALSO NASA-CR-108973

M-FS-20876

Investigation is described of methods for

obtaining uniform shear stress distribution in adhesives used in double-lap bonded joints. Design rules for reducing adhesive peak shear stresses are listed. Test results of an analysis of straight-lap joint design and stepped-lap joint design are given.

B70-10706

IMPROVED PROTECTION FOR SILICON SOLAR CELLS

BRODER, J. D. DATE- DEC. 1970

LEWIS-11065

Fluorinated ethylene propylene /FEP/ film is substituted for epoxy cement in bonding glass covers to silicon solar cells. Insensitivity of FEP to ultraviolet radiation reduces requirement for filtering and does not impair cell performance. Cell costs are reduced and cover mounting is simplified.

B70-10719

FIXTURE FOR PLATING STRIPPED CONDUCTORS OF

FLAT CONDUCTOR CABLES /FCC/

RAMSEY, L. E. DATE- DEC. 1970

M-FS-20122

Fixture supports flat conductor cables /FCC/ while providing electrical contact to stripped ends of cable during electroplating process. Cable is held in the form of a coil.

B70-10723

IMPROVED METHOD FOR CLADDING THE INSIDE OF

METAL TUBES

HAAG, W. L. MATTSON, W. F. DATE- DEC. 1970

LEWIS-11174

Creep characteristics of molybdenum at high temperature and stress are utilized to compress tungsten foil liner against inner surface of tantalum alloy cylinder to form bond at interface. Temperature and pressure can be accurately controlled and size of workpiece is limited only by furnace size.

## 09 COMPUTER PROGRAMS

B70-10063

SYSTEM AVAILABILITY MANAGEMENT TECHNIQUE

FOR RELIABILITY AND MAINTAINABILITY

ANALYSIS

DAVENPORT, G. K. /BENDIX CORP./ DATE- JUL. 1970

KSC-10315

Method for total system availability analysis is based on numerical prediction of the reliability, maintainability, and availability of each function system. It incorporates these functional-system estimates into an overall mathematical model.

B70-10067

AUTOMATIC DATA GENERATION SCHEME FOR

FINITE-ELEMENT METHOD /FEDGE/ - COMPUTER

PROGRAM

AKYUZ, F. DATE- SEP. 1970

NPO-11069

Algorithm provides for automatic input data preparation for the analysis of continuous domains in the fields of structural analysis, heat transfer, and fluid mechanics. The computer program utilizes the natural coordinate systems concept and the finite element method for data generation.

B70-10078

POLYNOMIAL-SMOOTHING AND

DERIVATIVE-ESTIMATING FORMULAS FOR

FUNCTIONS OF ONE OR TWO INDEPENDENT

VARIABLES

SEMTNER, A. J. DATE- AUG. 1970 REAN- SEE ALSO

NASA-CR-98657

NPO-11256

Application of polynomial-smoothing formulas and related derivative-estimating formulas simplifies certain linear least-squares problems. These problems can then be solved by a computer method.

B70-10091

WIRING HARNESSES DOCUMENTED BY PUNCHED-CARD

TECHNIQUE

B70-10132

HICKS, W. W. KLOEZEMAN, W. G. DATE- JUN. 1970  
REAN- SEE ALSO NASA-CR-97150  
NPO-11249

Cards representing a connector are punched, sorted, and then used to printout wiring documentation for that connector. When wiring changes are made, new cards are punched and the wiring documentation is reprinted to reflect the latest configuration.

B70-10132

COMPUTER PROGRAMS FOR DETERMINATION OF  
TRANSONIC FLOW PARAMETERS IN A  
CONVERGENT-DIVERGENT NOZZLE  
JAFPE, B. (RAO (G. V. R.) AND ASSOCIATES) RAO,  
G. V. R. DATE- NOV. 1970  
NPO-10895

Programs based on equations that include functions for boundary values along nozzle axis yield different types of flow field configurations. Program\*s documentation details method of calculating subsonic flow field and sonic line, and describes modified method of characteristics for calculating supersonic flow downstream of sonic line.

B70-10133

A PROGRAM FOR COMPUTING SHOCK-TUBE GAS  
DYNAMIC PROPERTIES  
HORTON, T. E. MENARD, W. A. DATE- MAY 1970  
NPO-11068

Computer program calculates thermodynamic properties from basic spectroscopic data. Program capacity is a mixture of 100 different species composed of ten different elements. The output is a complete thermodynamic and chemical description of the gas.

B70-10158

CALCULATION OF THE INERTIA TENSOR AND CENTER  
OF GRAVITY OF COMPLEX BODIES  
HOWARD, L. A. DATE- APR. 1970  
NPO-10827

Inertia tensor is calculated for each component part of a body about its own principal axes, and then with respect to the body\*s reference axes /rotation/. All parts are then combined to calculate the center of gravity and inertia tensor of the body.

B70-10184

PERT \*\*C\*\*  
SPON- INNOVATOR NOT GIVEN /MARSHALL SPACE FLIGHT  
CENTER/ DATE- SEP. 1970  
M-FS-20164

Computer program, PERT, provides method and technique for planning, evaluating, and graphically portraying in orderly related sequence the activities necessary to achieve a stated objective.

B70-10230

IMPROVED ANTENNA PATTERN RECORDER PROVIDES  
VISUAL DISPLAY OF RF POWER  
LIPIN, R., JR. /SPERRY RAND CORP./ DATE- AUG.  
1970

Antenna pattern recording system has a discretionary signal level monitor which senses a specified minimum level occurring between sampling intervals. This enables RF power and percent coverage to be calculated more accurately.

B70-10257

AUTOMATED VALIDATION OF A COMPUTER OPERATING  
SYSTEM  
DERVAGE, M. M. /BOEING CO./ MILBERG, B. A.  
DATE- DEC. 1970  
M-FS-14510

Programs apply selected input/output loads to complex computer operating system and measure performance of that system under such loads. Technique lends itself to checkout of computer software designed to monitor automated complex industrial systems.

B70-10265

SIMULTANEOUS RANDOM AND SEQUENTIAL COMPUTER  
PROCESSING USING AN EXPANDED SEQUENTIAL

INDEX

WARREN, C. G. /CHRYSLER CORP./ DATE- JUL. 1970  
M-FS-20266

Redesigned second-generation, tape-oriented computer system updates a data record, increases the capability to perform update runs, and produces a sequential report for every update run.

B70-10308

VISUAL DEVICE TO ASSIST COMPUTER PROGRAM  
DEBUGGING  
GARCIA, G. /N. AM. ROCKWELL CORP./ DATE- JUN.  
1970  
MSC-15833

Interrupt status indicators allow computer programs to be debugged during checkout and provide a quick-look analysis for updating. Computer coupled indicator lamps and lamp driver circuitry register program malfunctions in priority interrupt controlled programs.

B70-10317

COMPUTER PROGRAM FOR ANALYSIS OF FLOW  
ACROSS A GAS TURBINE SEAL  
SMITH, P. J. ZUK, J. DATE- JUL. 1970  
LEWIS-10975

Computer program analyzes the flow /leakage/ across a sealing dam for the case of steady, laminar, subsonic, isothermal, compressible flow. The analysis considers both parallel sealing-dam surfaces and surfaces with small tilt angles.

B70-10374

LOW-POWER INTEGRATED-CIRCUIT DRIVER FOR  
FERRITE-MEMORY WORD LINES  
KATZ, S. /RCA/ DATE- OCT. 1970  
ERC-10212

Composite circuit uses both n-p-n bipolar and p-channel MOS transistors /BIMOS/. The BIMOS driver provides 1/ ease of integrated circuit construction, 2/ low standby power consumption, 3/ bidirectional current pulses, and 4/ current-pulse amplitudes and rise times independent of active device parameters.

B70-10446

ERROR COMPENSATION FOR HYBRID-COMPUTER  
SOLUTION OF LINEAR DIFFERENTIAL EQUATIONS  
KEMP, N. H. /WOLF RES. AND DEVELOP. CORP./ DATE-  
NOV. 1970  
ERC-10262

Z-transform technique compensates for digital transport delay and digital-to-analog hold. Method determines best values for compensation constants in multi-step and Taylor series projections. Technique also provides hybrid-calculation error compared to continuous exact solution, plus system stability properties.

B70-10452

SELF TESTING AND REPAIRING COMPUTER - A  
CONCEPT  
AVIZIENIS, A. A. DATE- SEP. 1970  
NPO-10567

STAR computer has five redundant modular function units, fixed store, arithmetic, memory, input, and output. Each unit is connected to a diagnostic control unit, each is coded for error detection and error correction. Separation into function units permits assembly of many different systems from the set of units.

B70-10484

CONCEPT FOR HIGH SPEED COMPUTER PRINTER  
STEPHENS, J. W. /BOEING CO./ DATE- OCT. 1970  
KSC-10373

Printer uses Kerr cell as light shutter for controlling the print on photosensitive paper. Applied to output data transfer, the information transfer rate of graphic computer printers could be increased to speeds approaching the data transfer rate of computer central processors /5000 to 10,000 lines per minute/.

B70-10496

RAPID METHOD FOR INTERCONVERSION OF BINARY  
AND DECIMAL NUMBERS  
LIM, R. S. DATE- DEC. 1970  
ARC-10159

Decoding tree consisting of 40-bit semiconductor read-only memories interconverts binary and decimal numbers 50 to 100 times faster than current methods. Decimal-to-binary conversion algorithm is based on a divided-by-2 iterative equation, binary-to-decimal conversion algorithm utilizes multiplied-by-2 iterative equation.

B70-10501

# **COPTRAN - A METHOD OF OPTIMUM COMMUNICATION SYSTEMS DESIGN**

BRINKMAN, K. L. /HUGHES AIRCRAFT CO./ PRATT, W. K. STOKES, L. S. WEBER, J. W. DATE- OCT. 1970  
ERC-10273

Single set of mathematical expressions describes system cost and probability of error of data transmission in terms of four basic parameters in the link equation. A Lagrange multiplier sets up equations whose solutions yield the optimum values for system design considerations and weight and cost values.

B70-10532

# **DISC PACK CLEANING TABLE SAVES COMPUTER TIME**

GUY, J. T., SR. DATE- SEP. 1970  
LANGLEY-10590

Disc pack holding table is support frame upon which computer disc pack is loaded and protective cover released. This combination permits manual off-line cleaning of disc pack storage units at any time without shutting down the computer, and eliminates on-line disc drive unit to hold pack during cleaning.

B70-10555

# **SATURN S-2 BASE ENVIRONMENT FOR FLIGHT EVALUATION**

GEORGATSOIS, F. D. /N. AM. ROCKWELL CORP./ DATE- SEP. 1970  
M-FS-16597

Computer program reduces base region flight data to isothermal and cold wall conditions and predicts instrument readings before and after flight. The flight data is made appropriate for nominal J-2 engine combustion. This program is used for any five-engined stage with center engine fixed.

B70-10556

# **INFORMATION RETRIEVAL SYSTEM**

BERG, R. F. /BELLCOMM, INC./ HOLCOMB, J. E. KELROY, E. A. LEVINE, D. A. MEE, C., III DATE- OCT. 1970  
HQ-10426

Generalized information storage and retrieval system capable of generating and maintaining a file, gathering statistics, sorting output, and generating final reports for output is reviewed. File generation and file maintenance programs written for the system are general purpose routines.

B70-10557

# **NEUTRON AGES COMPUTED FROM EXPERIMENTAL ACTIVATION DATA**

SEMLER, T. T. DATE- OCT. 1970  
LEWIS-10949

Computer program reduces time manually required to compute neutron age and to provide definite plan of procedural choices. Program allows convenient comparison of several fitting and error analysis procedures. Program code provides for error estimation of various integration options.

B70-10561

# **GROUND COMPUTER TEST TRAP**

PONDRIE, D. G. /IBM/ HIGGINS, P. H. DATE- NOV. 1970 REAN- SEE ALSO B70-10560  
KSC-10574

Test trap consists of logic nest of five printed circuit boards, plus power supply within the unit. Device monitors more than one logic area simultaneously, gives visual display of detected error, operates at computer speed, maintains readily available logic description of cards used, and is compatible with existing computer circuitry.

B70-10597

# **DIGITAL PROGRAM ANALYZES SUPERSONIC FLOW FIELD WITHIN BELL-SHAPED ROCKET NOZZLES**

ELLIOTT, J. J. /N. AM. ROCKWELL CORP./ STROMSTA, R. R. DATE- NOV. 1970  
M-FS-14292

Digital computer program computes and analyzes supersonic flow field in axisymmetric rocket nozzle for specified gas properties, nozzle geometry, and input or starting line. Method of characteristics is used for solution of set of hyperbolic partial differential equations.

B70-10599

# **A METHOD OF NUMERICALLY CONTROLLED MACHINE PART PROGRAMMING**

SPON- INNOVATOR NOT GIVEN /BOEING CO./ DATE- NOV. 1970  
M-FS-15039

Computer program is designed for automatically programmed tools. Preprocessor computes desired tool path and postprocessor computes actual commands causing machine tool to follow specific path. It is used on a Cincinnati ATC-430 numerically controlled machine tool.

B70-10601

# **CINDA-3G - IMPROVED NUMERICAL DIFFERENCING ANALYZER PROGRAM FOR THIRD-GENERATION COMPUTERS**

GASKI, J. D. /CHRYSLER CORP./ LEWIS, D. R. THOMPSON, L. R. DATE- DEC. 1970  
MSC-11653

Thermal analyzer program, CINDA-3G, uses improved systems software and increased machine speeds. Program options offer user variety of methods for solution of thermal analog models presented in network format. It is written in FORTRAN 5 and SLEUTH 2 for use on Univac 1108 computer.

B70-10602

# **EXPANDED SUN-LOOK ANGLE PROGRAM**

BOYD, C. C. /LOCKHEED ELECTRON. CO./ DATE- DEC. 1970  
MSC-13176

Computer program provides time history of sun aspect angles as seen from spacecraft and generates binary tape containing time history of position, velocity, and body attitude angles of vehicle in local horizontal, local vertical system. Program is written in FORTRAN 5 and SLEUTH 2 for Univac 1108 computer.

B70-10603

# **MULTIBODY INTERPLANETARY SWINGBY TRAJECTORIES /MIST-1/**

DAVIS, D. A. /BOEING CO./ ROBERTS, G. R. DATE- DEC. 1970  
M-FS-15081

Computer program incorporates new isolation procedure to determine interplanetary trajectories which utilize a maximum of three flybys. Program also computes single planet flybys and direct transfer trajectories. The three principle systems employed in MIST-1 use as their fundamental plane the mean plane of the earth's orbit around the sun.

B70-10605

# **POST FLIGHT DYNAMIC ANALYSIS SIMULATION**

GREGORY, B. R. /BOEING CO./ DATE- NOV. 1970  
M-FS-15067

Digital six-degrees-of-freedom, open loop Saturn 5 first stage flight evaluation simulation program obtains post flight simulation of the launch vehicle using actual flight data as input. Results are compared with measured data. For preflight analysis, the program uses predicted flight data as input.

B70-10606

# **COMPUTERIZED TOROIDAL TRANSFORMER DESIGN**

SPON- INNOVATOR NOT GIVEN /CALTECH/JPL/ DATE- NOV. 1970  
NPO-11115

Computer program designs transformers which have one primary /center tap permissible/ and up to 20 untapped secondaries, and which can handle up to 500 V across any one winding. Computer

B70-10613

determines total secondary power, core type, primary turns, secondary turns, and wire sizes for primary and secondary windings.

B70-10613

CONDENSATION OF WET VAPORS IN TURBINES  
KOTHMAN, R. E. /WESTINGHOUSE ASTRONUC. LAB./  
DATE- NOV. 1970  
NPO-10773

Computer program predicts condensation point in wet vapor turbines and analyzes subsequent nucleation and growth processes to determine both moisture content and drop size and number distribution as a function of position. Program includes effects of molecular association on condensation and flow processes and handles both subsonic and supersonic flows.

B70-10614

RELIABILITY ANALYSIS MODEL  
SPON- INNOVATOR NOT GIVEN /BOEING CO./ DATE- NOV.  
1970 REAN- SEE ALSO B68-10252  
M-FS-14513

RAM program determines probability of success for one or more given objectives in any complex system. Program includes failure mode and effects, criticality and reliability analyses, and some aspects of operations, safety, flight technology, systems design engineering, and configuration analyses.

B70-10615

ANALYSIS OF SURFACE ABLATION OF NONCHARRING MATERIALS  
MATTING, F. W. DATE- NOV. 1970 REAN- SEE ALSO  
NASA-TN-D-3758  
ARC-10223

Computer program solves combined problem of heat transfer and material response for the stagnation region of blunt bodies experiencing melting and vaporizing or subliming ablation. Program contains formulas for the transitional regime to bridge between the free-molecule and continuum regimes.

B70-10625

SEPARATION OF TWO BODIES IN SPACE  
CHAMBERLAIN, R. G. MACK, T. H. SILSBY, W. DATE-  
DEC. 1970  
NPO-10663

Computer program analyzes the motion of two rigid bodies in space, separating as a result of any one, or a combination of, the following mechanisms - springs with ball ends, springs with one end guided, pyrotechnics, rockets, cold-gas jets, air pistons, and Coulomb drag.

B70-10637

GLOBAL SEARCH ALGORITHM FOR OPTIMAL CONTROL  
BROCKER, D. H. KAVANAUGH, W. P. STEWART, E. C.  
DATE- DEC. 1970 REAN- SEE ALSO NASA-TN-D-5642  
ARC-10359

Random-search algorithm employs local and global properties to solve two-point boundary value problem in Pontryagin maximum principle for either fixed or variable end-time problems. Mixed boundary value problem is transformed to an initial value problem. Mapping between initial and terminal values utilizes hybrid computer.

B70-10642

MICROPROGRAM SCHEME FOR AUTOMATIC RECOVERY FROM COMPUTER ERROR  
BATTIN, R. A. /MIT/ COPPS, E. M. HOPKINS, A. L., JR. MILLER, J. S. SMITH, H. B. DATE- DEC.  
1970  
MSC-13387

Microprogram scheme enables computer to recover from failure in one of its two central processing units during time duration of instruction in which failure occurs. Microprogram advantages include - /1/ built-in interpretive capability, /2/ selection of processing interrupts by priority, and /3/ economical use of bootstrap sequence.

B70-10660

MAN-MACHINE INTERACTIVE SYSTEM SIMPLIFIES COMPUTER-AIDED CIRCUIT DESIGN  
BAVUSO, S. J. DATE- DEC. 1970

LANGLEY-10711

Langley interactive computerized circuit analysis capability /LICCA/ enables designer to draw electronic circuit diagrams on cathode ray tube screen. This information is submitted as input to user-selected circuit analysis program. LICCA accommodates binary logic circuits and circuits with discrete components, and monitors operator\* instructions to detect errors.

B70-10669

COMPUTER PROGRAM FOR THE DESIGN OF AXIAL-FLOW TURBINES  
CARTER, A. F. /NORTHERN RES. AND ENG. CORP./  
LENHERR, F. K. DATE- DEC. 1970 REAN- SEE ALSO  
B69-10111  
LEWIS-11029

Computer program, capable of analyzing single and multispool units, computes absolute and relative flow fields within the turbine at the first stator inlet, at each interblade row plane, and at the final rotor exit. No simplifying assumptions are made which would result in restrictive design.

B70-10698

IMPROVED CONVOLUTIONAL CODING  
DOLAND, G. D. /LOCKHEED ELECTRON. CO./ DATE-  
DEC. 1970  
MSC-13625

Convolutional coding, used to upgrade digital data transmission under adverse signal conditions, has been improved by a method which ensures data transitions, permitting bit synchronizer operation at lower signal levels. Method also increases decoding ability by removing ambiguous condition.

B70-10705

DIGITAL SIMULATION PROGRAM IMPROVED  
BRAMBLETT, E. K. /N. AM. ROCKWELL CORP./ DATE-  
DEC. 1970  
M-FS-01504

Modified Integration Digital Analog Simulation /MIDAS/ program, which provides time oriented solutions to equations from system block diagram descriptions, is given greater speed, accuracy, flexibility, and applicability. Improved program incorporates additional elements for extended solution capability not readily available from analog computers.

B70-10720

TIME DATA SEQUENTIAL PROCESSOR /TDSP/  
JOSEPH, A. E. PAVLOVITCH, T. ROTH, R. Y.  
STURMS, F. M. DATE- DEC. 1970  
NPO-11327

Time Data Sequential Processor /TDSP/ computer program provides preflight predictions for lunar trajectories from injection to impact, and for planetary escape trajectories for up to 100 hours from launch. One of the major options TDSP performs is the determination of tracking station view periods.

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## Subject Index

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## AERODYNAMICS

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Separation of two bodies in space  
NPO-10663 B70-10625 09

High temperature circuit breaker  
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## AEROTHERMOCHEMISTRY

A program for computing shock-tube gas  
dynamic properties  
NPO-11068 B70-10133 09

## AGGLOMERATION

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gas-diffusion electrode  
HQ-10536 B70-10059 01

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by rate of cooling after solution annealing  
M-FS-18790 B70-10213 04

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large-diameter cylinders from aluminum-2014  
M-FS-14385 B70-10243 04

Mechanism and kinetics of aging in  
Inconel 718  
M-FS-18775 B70-10261 04

Thermal treatment and mechanical properties  
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M-FS-20559 B70-10369 04

Effects of crystal defects on  
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alloy 7075  
M-FS-18794 B70-10506 04

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possible applications for pollution  
monitoring  
NPO-10535 B70-10187 03

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M-FS-20508 B70-10368 07

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samples  
MSC-12320 B70-10545 05

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MSC-15646 B70-10041 08

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flow for cooling

HQ-10442 B70-10295 07

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M-FS-20583 B70-10143 02

Sinusoidal-pressure generator for testing  
dynamic pressure probes  
LEWIS-11094 B70-10352 06

Low-noise flow valve for air ducts  
MSC-13441 B70-10640 07

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Gas turbine combustor insensitive to  
compressor outlet distortion  
LEWIS-10286 B70-10312 07

## AIR JETS

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LEWIS-11129 B70-10670 03

## AIR LOCKS

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and output power of carbon dioxide laser  
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HQ-10389 B70-10108 03

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NPO-11013 B70-10248 07

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LANGLEY-10705 B70-10525 05

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of complex programs  
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Doppler effect  
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A new method for measuring slipperiness of airport runways and other paved surfaces  
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GSFC-10097	B70-10521	01	Immersed ultrasonic inspection of high acoustical attenuative structures		
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A stabilized low-frequency alternating-current electric arc			HQ-10548	B70-10157	01
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NPO-11215	B70-10253	05	Swept-frequency UHF radiometer for deep probes of earth - A concept		
<b>ANNEALING</b>			MSC-13428	B70-10617	02
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M-FS-18712	B70-10092	04	Antenna-array, phase quadrature tracking system		
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M-FS-18790	B70-10213	04	Improved manual radio frequency direction finder		
Integrated turbine-compressor provides air flow for cooling			M-FS-20507	B70-10422	02
HQ-10442	B70-10295	07	Improved modified turnstile antenna		
Improved welding of Rene-41			MSC-12209	B70-10482	01
M-FS-18821	B70-10367	08	Electronic scanning of 2-channel monopulse patterns		
Visible light electroluminescent diodes of indium-gallium phosphide			GSFC-10299	B70-10485	02
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NPO-11390	B70-10585	04	<b>ANTENNAS</b>		
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ERC-10302	B70-10500	01	Commutating brushes tested in dc motors in dry argon atmospheres		
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## DATA TRANSMISSION

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ERC-10211 B70-10372 01

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## DIAMONDS

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M-FS-16172	B70-10394	06					
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## ELECTRODEPOSITION

Suppression of zinc dendrites in zinc  
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NPO-12064	B70-10531	04	MSC-13433	B70-10037	07
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NPO-11454	B70-10726	03	M-FS-18087	B70-10124	06
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**HEART FUNCTION**  
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## HEART RATE

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LEWIS-11209 B70-10672 04

**NICKEL COMPOUNDS**

Several new catalysts for reduction of oxygen in fuel cells  
HQ-10452 B70-10021 01

## NICKEL FLUORIDES

Self-lubricating fluorine shaft seal material  
HQ-10112 B70-10222 04

## NICKEL PLATE

Advances in electrometer vacuum tube design  
GSPC-10729 B70-10696 01

## NIOBATES

Dopant for sodium niobate capacitor dielectric  
MSC-11773 B70-10190 01

Magnesium oxide doping reduces acoustic wave attenuation in lithium metatantalate and lithium metaniobate crystals  
ERC-10463 B70-10269 03

Fabrication of electroacoustic RF amplifiers  
ERC-10266 B70-10460 01

## NIOBIUM

The columbium-hydrogen system and hydrogen embrittlement of columbium  
M-FS-18659 B70-10146 04

## NIOBIUM ALLOYS

Mechanism and kinetics of aging in Inconel 718  
M-FS-18775 B70-10261 04

Oxidation-resistant coatings for refractory metals used in inert atmospheres  
NPO-11477 B70-10674 04

## NIOBIUM CARBIDES

Friction characteristics of graphite and graphite-metal combinations at various temperatures  
NUC-10151 B70-10467 04

## NIOBIUM COMPOUNDS

Development of superconductive magnets  
LEWIS-11170 B70-10678 03

## NITRATES

Stress corrosion crack inhibiting method for titanium  
NPO-10271 B70-10129 03

## NITRIC ACID

Reactions of technetium hexafluoride with nitric acid, nitrosyl fluoride, and nitryl fluoride  
ARG-10412 B70-10233 04

## NITRIC OXIDE

Reactions of technetium hexafluoride with nitric acid, nitrosyl fluoride, and nitryl fluoride  
ARG-10412 B70-10233 04

## NITRIDES

Growth of single-crystal gallium nitride  
ERC-10301 B70-10473 03

## NITRO COMPOUNDS

Intumescent coatings as fire retardants  
ARC-10099 B70-10450 04

## NITROGEN

Several new catalysts for reduction of oxygen in fuel cells  
HQ-10452 B70-10021 01

Gas flowmeter  
M-FS-20663 B70-10050 07

A stabilized low-frequency alternating-current electric arc  
LEWIS-10442 B70-10065 01

Atmospheric composition affects heat- and mass-transfer processes  
HQ-10271 B70-10094 04

Estimating sensitivity of vacuum gages

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# NONFERROUS METALS

LEWIS-11007	B70-10099	03	<b>NOISE REDUCTION</b>		
Ultrasonic propagation in gases at high temperatures			Improved magnetron cold-cathode ion source		
HQ-10498	B70-10137	03	LANGLEY-10387	B70-10023	02
Prediction of gas leakage of environmental control systems			Data acquisition from high-speed rotating shafts		
HQ-10270	B70-10201	05	LEWIS-10886	B70-10043	01
Uniform data system standardizes technical computations and the purchasing of commercially important gases			Immersed ultrasonic inspection of high acoustical attenuative structures		
NUC-10549	B70-10333	04	MSC-15702	B70-10055	03
Improved photoionization mass spectrometer			Improved low cost ac-to-dc converter		
LANGLEY-10180	B70-10402	04	NPO-11055	B70-10076	01
Testing of brazed and welded connections of stainless-steel tubing			Highly stable biased amplifier and stretcher system		
M-FS-20806	B70-10417	08	ARG-10354	B70-10142	01
Strain compatibility tests for sprayed foam cryogenic insulation			COPTRAN - A method of optimum communication systems design		
M-FS-16063	B70-10423	04	ERC-10273	B70-10501	09
Bistable fluidic valve is electrically switched			Simple data-smoothing and noise-suppression technique		
NPO-10416	B70-10517	07	M-FS-20803	B70-10627	06
Novel wave generator adaptable to indoor surfboarding			Technique for lowering the noise figure in RF amplifiers		
LEWIS-11096	B70-10563	03	HQ-10435	B70-10650	01
Deadweight calibration of pressure gages without contamination			<b>NOISE SPECTRA</b>		
M-FS-18690	B70-10586	07	Comparison of aerodynamic noise from three nose-cylinder combinations		
Determination of nitrogen in titanium nitride			M-FS-20816	B70-10690	03
LEWIS-11046	B70-10588	04	<b>NOISE THRESHOLD</b>		
Crystal growing by electrodeposition from dense gaseous solutions			Graphical method to predict the dynamic response of FM receivers		
NPO-10440	B70-10676	04	KSC-10111	B70-10119	01
<b>NITROGEN COMPOUNDS</b>			Audio signal processor		
Photochromism of dihydroquinolines			MSC-12223	B70-10180	01
HQ-10574	B70-10574	04	<b>NONDESTRUCTIVE TESTS</b>		
<b>NITROGEN OXIDES</b>			Sonic impedance technique detects flaws in polyurethane foam spray-on insulation		
Airborne spectrometer senses several gases			M-FS-20561	B70-10012	06
MSC-13234	B70-10438	03	A method for the visual detection of holes in thin polymeric films		
<b>NITROGEN TETROXIDE</b>			LEWIS-10876	B70-10027	04
Long life, low cost ball valve, with lifted seals and cartridge type construction			Acoustic vibration test detects intermittent electrical discontinuities		
MSC-13430	B70-10653	07	MSC-15158	B70-10118	01
<b>NITROSILS</b>			Holographic stress analysis		
Reactions of technetium hexafluoride with nitric acid, nitrosyl fluoride, and nitryl fluoride			M-FS-20687	B70-10123	01
ARG-10412	B70-10233	04	Nondestructive sonic testing of adhesive-bonded composites		
<b>NITRIL FLUORIDES</b>			M-FS-20793	B70-10397	08
Reactions of technetium hexafluoride with nitric acid, nitrosyl fluoride, and nitryl fluoride			Nondestructive assessment of penetration of electron-beam welds		
ARG-10412	B70-10233	04	MSC-15955	B70-10466	08
<b>NOBLE METALS</b>			Ultrasonic detection of flaws in fusion butt welds		
Several new catalysts for reduction of oxygen in fuel cells			M-FS-20824	B70-10514	08
HQ-10452	B70-10021	01	Nondestructive spot tests allow rapid identification of metals		
High-temperature, long-term drift of platinum-rhodium thermocouples			LANGLEY-10539	B70-10520	04
LEWIS-11111	B70-10552	01	Compression springs used for vibration isolation		
<b>NOISE (SOUND)</b>			NPO-11012	B70-10523	07
Radiometric absolute noise-temperature measurement system features improved accuracy and calibration ease			Latching overcurrent circuit breaker		
ERC-90066	B70-10376	01	NPO-11131	B70-10524	01
<b>NOISE INTENSITY</b>			<b>NONFERROUS METALS</b>		
Methods for measuring the loudness and noisiness of complex sounds			Metal detector system		
HQ-10332	B70-10260	03	ARC-10265	B70-10511	01
			Metal drilling with portable hand drills		

# NONFLAMMABLE MATERIALS

# SUBJECT INDEX

M-FS-15180	B70-10594	08	NOZZLE FLOW		
NONFLAMMABLE MATERIALS			Simplified computation of compressible fluid flow parameters		
A new low-expansion nonflammable printed circuit board			KSC-10400	B70-10225	06
M-FS-20408	B70-10154	01	Swirl-can combustor segment		
			LEWIS-11082	B70-10322	07
Chemical treatment makes aromatic polyamide fabric fireproof in oxygen atmosphere	B70-10540	04	NOZZLE GEOMETRY		
MSC-13571			Digital program analyzes supersonic flow field within bell-shaped rocket nozzles		
New type of nonflammable paper	B70-10546	04	M-FS-14292	B70-10597	09
MSC-13432			NOZZLE THRUST COEFFICIENTS		
Nonflammable organic adhesives effective over wide temperature range	B70-10644	04	Digital program analyzes supersonic flow field within bell-shaped rocket nozzles		
MSC-13586			M-FS-14292	B70-10597	09
NONLINEAR EQUATIONS			NOZZLES		
General technique for measurement of refractive index variations			Temperature-controlled fluidic device		
HQ-10359	B70-10064	01	A concept		
			HQ-10446	B70-10167	03
The determination of stability domains for nonlinear dynamical systems	B70-10539	03	Flow characteristics of an air jet impinging on a flat surface		
M-FS-14832			LEWIS-11129	B70-10670	03
Global search algorithm for optimal control	B70-10637	09	NUCLEAR CAPTURE		
ARC-10359			Single-level resonance parameters fit nuclear cross-sections		
NONLINEAR SYSTEMS			NUC-10101	B70-10686	03
Performance-limit criteria for the design of fast-response servo-actuation systems	B70-10152	02	NUCLEAR ENERGY		
LEWIS-11022			Thermally induced oscillations in fluid flow		
Theory and application of Kalman filtering	B70-10309	06	M-FS-20449	B70-10299	03
M-FS-20491			NUCLEAR ENGINE FOR ROCKET VEHICLES		
Coulometer battery state-of-charge indicator	B70-10323	01	A computer program for evaluating propellant heating and radiation dosage to crews of nuclear-powered rocket vehicles		
LEWIS-11083			LEWIS-10951	B70-10648	01
Nonlinear damping in structures	B70-10341	03	NUCLEAR FISSION		
M-FS-20701			Single-level resonance parameters fit nuclear cross-sections		
NONLINEARITY			NUC-10101	B70-10686	03
Simple, accurate temperature-measuring instrument	B70-10303	01	NUCLEAR FUELS		
MSC-12327			Single-level resonance parameters fit nuclear cross-sections		
NONPOLAR GASES			NUC-10101	B70-10686	03
Solubility of non-polar gases in electrolyte solutions	B70-10114	04	NUCLEAR FUSION		
LEWIS-11052			Theoretical study of a plasma accelerator		
Simple method for predicting viscosity of gas mixtures	B70-10361	04	NPO-11480	B70-10683	03
LEWIS-11060			NUCLEAR HEAT		
NONUNIFORMITY			Calorimeter measures high nuclear heating rates and their gradients across a reactor test hole		
An improvement in blackbody cavity design	B70-10711	03	NUC-10227	B70-10356	03
LANGLEY-10292			NUCLEAR MAGNETIC RESONANCE		
NOSE CONES			Properties of nonaqueous electrolytes		
Comparison of aerodynamic noise from three nose-cylinder combinations	B70-10690	03	LEWIS-11017	B70-10080	04
M-FS-20816			Precise audio-frequency markers for nuclear magnetic resonance spectra		
NOTCH STRENGTH			NPO-11147	B70-10086	02
Low-temperature embrittlement of Ti-6Al-4V and Inconel-718 by high pressure hydrogen	B70-10364	04	Single-level resonance parameters fit nuclear cross-sections		
M-FS-18753			NUC-10101	B70-10686	03
NOTCH TESTS			NUCLEAR PHYSICS		
Effects of high pressure hydrogen on metals	B70-10162	04	Data from various sources provide standard single-level resonance parameters for uranium 233		
M-FS-18612			NUC-10229	B70-10357	03
The mechanism of stress-corrosion cracking in 7075 aluminum alloy	B70-10527	04	Neutron ages computed from experimental activation data		
M-FS-18614			LEWIS-10949	B70-10557	09
NOTCHES			Single-level resonance parameters fit nuclear cross-sections		
Vee-notch tool cuts specimens	B70-10411	06	NUC-10101	B70-10686	03
M-FS-20730					
NOZZLE DESIGN					
Experimental investigation and analysis of two sources of nozzle-thrust misalignment	B70-10406	06			
NPO-11355					



## NUCLEAR POWER PLANTS

Water-filled heat pipe useful at moderate temperatures  
M-FS-20543 B70-10106 03

## NUCLEAR PROPULSION

A computer program for evaluating propellant heating and radiation dosage to crews of nuclear-powered rocket vehicles  
LEWIS-10951 B70-10648 01

## NUCLEAR RADIATION

A power semiconductor test circuit with reduced power requirements  
LEWIS-11175 B70-10498 01

Electrothermal fracturing of tensile specimens  
NUC-10185 B70-10566 07

High temperature circuit breaker  
LEWIS-90265 B70-10721 01

## NUCLEAR REACTORS

Compact, electromagnetic multiple-stream pump for liquid metals - Design concept  
NPO-10755 B70-10090 07

The effects of nuclear power generators upon electronic instrumentation  
NPO-11217 B70-10272 03

Calorimeter measures high nuclear heating rates and their gradients across a reactor test hole  
NUC-10227 B70-10356 03

High-temperature oxidation and erosion-resistant refractory coatings  
LEWIS-11221 B70-10634 04

Single-level resonance parameters fit nuclear cross-sections  
NUC-10101 B70-10686 03

## NUCLEAR RESEARCH

Three-dimensional pantograph for use in hazardous environments  
NUC-10222 B70-10567 07

## NUCLEATION

Growth of phase-pure, crack-free single crystals and large-grained polycrystals of molybdenum disilicide  
HQ-10450 B70-10206 04

Condensation of wet vapors in turbines  
NPO-10773 B70-10613 09

## NUCLEI (NUCLEAR PHYSICS)

Single-level resonance parameters fit nuclear cross-sections  
NUC-10101 B70-10686 03

## NUMERICAL ANALYSIS

Error compensation for hybrid-computer solution of linear differential equations  
ERC-10262 B70-10446 09

## NUMERICAL CONTROL

Fail-safe numerical control  
M-FS-12613 B70-10522 02

A method of numerically controlled machine part programming  
M-FS-15039 B70-10599 09

## NUMERICAL INTEGRATION

Derivation of a general perturbation solution - Its application to determination of orbit  
MSC-13377 B70-10442 03

Separation of two bodies in space  
NPO-10663 B70-10625 09

Single-level resonance parameters fit nuclear cross-sections  
NUC-10101 B70-10686 03

## NUTATION

Flueric-controller pneumatic stepping motor system  
LEWIS-11051 B70-10332 02

## NUTRITIONAL REQUIREMENTS

A mathematical model of the effect of a predator on species diversity  
NPO-11230 B70-10006 05

## NUTS (FASTENERS)

Comparison of release torques of tightened bolts in vacuum and air  
M-FS-20773 B70-10395 06

Special wrench for B-nuts reduces torque stress in tubing  
MSC-15885 B70-10550 07

Electrothermal fracturing of tensile specimens  
NUC-10185 B70-10566 07

Automatic, computerized testing of bolts  
NPO-11090 B70-10657 06

## NYLON (TRADEMARK)

High-field superconducting nested coil magnet  
ARG-10060 B70-10061 03

An explosion-proof battery case  
MSC-12335 B70-10304 01

Improved reinforcement for openings in difficult fabrics  
MSC-13554 B70-10489 08

Medical vest broadens treatment capability  
KSC-10577 B70-10529 05

Filled polymers for bearings and seals used in liquid hydrogen  
LEWIS-10887 B70-10573 04

Rugged, low-conductance, heat-flow probe  
MSC-13443 B70-10622 03

Miniature multicontact connectors  
LANGLEY-10740 B70-10724 01

## NYQUIST DIAGRAM

Computerized polar plots by a cathode ray tube/grid overlay method  
M-FS-14464 B70-10311 03

## NYQUIST FREQUENCIES

Biomedical sensing and display concept improves brain wave monitoring  
ERC-10233 B70-10447 05



## O RING SEALS

Quantitative conversion of water to carbon dioxide  
NPO-10731 B70-10013 04

High pressure flow-rate switch  
NPO-10722 B70-10028 07

Improved quick-disconnect electrical connector  
M-FS-20610 B70-10109 01

Four-way, full-throttling valve concept  
MSC-13437 B70-10165 07

Umbilical disconnect actuator  
NPO-11202 B70-10170 07

Miniature spray-painting booth  
MSC-15811 B70-10549 03

Bidirectional flow meter  
M-FS-18737 B70-10589 07

Gage for measuring coastal erosion and sedimentation

## OBSIDIAN

## SUBJECT INDEX

LANGLEY-10779	B70-10629	01	OPERATIONAL PROBLEMS		
OBSIDIAN			System availability management technique for reliability and maintainability analysis		
Spectral emission measurement of igneous rocks using a spectroradiometer			KSC-10315	B70-10063	09
M-FS-20837	B70-10661	04	OPERATIONS		
OCEAN CURRENTS			Post-operative cranial pressure monitoring system		
Chebyshev minimax control theory			ERC-10336	B70-10436	05
M-FS-20639	B70-10315	03	OPTICAL COMMUNICATION		
OCEANOGRAPHY			COPTRAN - A method of optimum communication systems design		
Solubility of non-polar gases in electrolyte solutions			ERC-10273	B70-10501	09
LEWIS-11052	B70-10114	04	Traveling-wave photodetector has sub-nanosecond response		
High-powered automatic latching device			GSFC-10831	B70-10641	02
MSC-15474	B70-10198	07	OPTICAL COUPLING		
Increased resistance to stress corrosion of aluminum alloys			Neutron-image intensifier		
M-FS-20788	B70-10396	04	ARG-10249	B70-10240	03
Reliability Analysis Model			OPTICAL EQUIPMENT		
M-FS-14513	B70-10614	09	High efficiency optical beamsplitter designed for operation in the infrared region		
Systems approach provides management control of complex programs			GSFC-10721	B70-10211	02
M-FS-20791	B70-10647	06	Improved ultraviolet resonance lamp		
ODORS			ARC-10030	B70-10237	01
Miniature spray-painting booth			Regulated-current dc power supply for gaseous-discharge lamps		
MSC-15811	B70-10549	03	GSFC-10293	B70-10239	02
OFF-ON CONTROL			Improved optical lens system		
An electrothermally actuated micro valve			NPO-11311	B70-10354	03
NPO-10730	B70-10171	07	Multispectral facsimile reproducer		
Brushless direct-current motors			LANGLEY-10618	B70-10360	03
NPO-11351	B70-10234	02	Directional coupler for optical waveguides		
High intensity heat-pulse source operates without cooling system			ERC-10094	B70-10381	03
ARC-10178	B70-10694	03	Automatic optometer operates with infrared test pattern		
OIL EXPLORATION			ARC-10095	B70-10401	05
Swept-frequency UHF radiometer for deep probes of earth - A concept			Laser method for finding axis of rotation		
MSC-13428	B70-10617	02	ARC-10388	B70-10439	03
OILS			Ambient-light-absorbing screen for front projection		
High pressure flow-rate switch			ERC-90017	B70-10472	03
NPO-10722	B70-10028	07	Concept for high speed computer printer		
Hydrodynamic squeeze-film bearings for gyroscopes			KSC-10373	B70-10484	09
M-FS-20802	B70-10389	07	OPTICAL FILTERS		
Deadweight calibration of pressure gages without contamination			Compact apparatus for photogeneration of hydrated electrons		
M-FS-18690	B70-10586	07	ARG-10487	B70-10036	03
Metal drilling with portable hand drills			Dual-wavelength system monitors deposition of films - A concept		
M-FS-15180	B70-10594	08	M-FS-20675	B70-10658	03
Optical contamination during thermal testing in vacuum			OPTICAL HETERODYNING		
M-FS-20736	B70-10659	03	Laser-Doppler gas velocimeter		
OLIVINE			M-FS-20583	B70-10143	02
Spectral emission measurement of igneous rocks using a spectroradiometer			COPTRAN - A method of optimum communication systems design		
M-FS-20837	B70-10661	04	ERC-10273	B70-10501	09
OMNIDIRECTIONAL ANTENNAS			OPTICAL MEASUREMENT		
Analysis and optimization of an omnidirectional direction-finding system			Picosecond pulse measurement by two-photon excitation of photographic film		
M-FS-14346	B70-10112	02	ERC-10227	B70-10377	02
OPERATING TEMPERATURE			Dual-wavelength system monitors deposition of films - A concept		
Thermally cascaded thermoelectric generator			M-FS-20675	B70-10658	03
NPO-10753	B70-10280	03	OPTICAL MEASURING INSTRUMENTS		
OPERATIONAL HAZARDS			Slide checkout console		
Astronaut Rescue Air Pack /ARAP/ and Emergency Egress Air Pack /EEAP/					
KSC-10522	B70-10680	03			

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## ORIFICES

MSC-12318	B70-10290	02	<b>OPTOMETRY</b>	Automatic optometer operates with infrared test pattern		
Quasi-optical equivalent of waveguide slide screw tuner			ARC-10095		B70-10401	05
ERC-10312	B70-10384	01	<b>ORBIT CALCULATION</b>	Orbit, reentry, and landing attachment for globes		
<b>OPTICAL POLARIZATION</b>			LANGLEY-10626		B70-10656	03
Interferometer for measurement of optical polarization			<b>ORBIT PERTURBATION</b>	Derivation of a general perturbation solution - Its application to determination of orbit		
NPO-11239	B70-10405	03	MSC-13377		B70-10442	03
<b>OPTICAL PROPERTIES</b>			<b>ORBITAL MECHANICS</b>	Time Data Sequential Processor /TDSP/		
Magnesium oxide doping reduces acoustic wave attenuation in lithium metatantalate and lithium metaniobate crystals			NPO-11327		B70-10720	09
ERC-10463	B70-10269	03	<b>ORBITRONS</b>	An improved Orbitron ionization gage measures ultrahigh vacuum		
Holographic photography of high velocity particles			LANGLEY-10535		B70-10611	03
ERC-10318	B70-10371	03	<b>ORGANIC COMPOUNDS</b>	Investigation of the reactivity of organic materials in liquid oxygen		
Improved linings for integrating spheres			M-FS-20576		B70-10285	04
MSC-12237	B70-10413	03	<b>ORGANIC MATERIALS</b>	Investigation of the reactivity of organic materials in liquid oxygen		
Ambient-light-absorbing screen for front projection			M-FS-20576		B70-10285	04
ERC-90017	B70-10472	03		Chemical treatment makes aromatic polyamide fabric fireproof in oxygen atmosphere		
Less-expensive Rochon prisms			MSC-13571		B70-10540	04
M-FS-20554	B70-10681	03		New type of nonflammable paper		
<b>OPTICAL RADAR</b>			MSC-13432		B70-10546	04
High-accuracy detector for laser radar			<b>ORGANOMETALLIC COMPOUNDS</b>	Intermolecular bonding of metals or alloys by thermochemical decomposition		
MSC-13275	B70-10570	01	M-FS-13823		B70-10194	08
<b>OPTICAL REFLECTION</b>			<b>ORIFICE FLOW</b>	Discharge coefficients for thick-plate orifices		
Sonic impedance technique detects flaws in polyurethane foam spray-on insulation			LEWIS-11067		B70-10062	06
M-FS-20561	B70-10012	06		Prediction of gas leakage of environmental control systems		
Toroidal mirrors provide virtual walls for breaks in light pipes			HQ-10270		B70-10201	05
ARC-10031	B70-10632	03		Simplified computation of compressible fluid flow parameters		
<b>OPTICAL RESONANCE</b>			KSC-10400		B70-10225	06
High temperature ion source				Precision control system for engine fuel		
ERC-10197	B70-10379	03	NPO-12017		B70-10244	07
<b>OPTICS</b>			<b>A temperature-controlled fluid flow regulator</b>			
Collodion technique of mirror cleaning			M-FS-14259		B70-10283	07
LANGLEY-10675	B70-10463	04		Hydraulic characteristics of flow through miniature slits		
Visual focus stimulator aids in study of the eye's focusing action			NPO-11354		B70-10400	07
ARC-10049	B70-10568	05		Bidirectional flow meter		
<b>OPTIMAL CONTROL</b>			M-FS-18737		B70-10589	07
Method of statistical filtering			<b>ORIFICES</b>	Adjustable flow restrictor		
MSC-13493	B70-10427	06	MSC-13433		B70-10037	07
Optimal electric-drive system for vehicles				Investigation of positive shaft seals		
NPO-11210	B70-10435	02	M-FS-18589		B70-10176	07
Optimum Multi-Impulse Rendezvous program				Spray momentum measuring equipment		
MSC-13139	B70-10623	06	MSC-12305		B70-10224	06
Global search algorithm for optimal control				Novel wave generator adaptable to indoor surfing		
ARC-10359	B70-10637	09	LEWIS-11096		B70-10563	03
<b>OPTIMIZATION</b>				Low leak rate poppet-and-seat check valve		
New model performance index for engineering design of control systems						
HQ-10520	B70-10293	06				
Optimum structural design based on reliability analysis						
NPO-11261	B70-10399	06				
Optimum Multi-Impulse Rendezvous program						
MSC-13139	B70-10623	06				
<b>OPTIONS</b>						
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LEWIS-10949	B70-10557	09				
Time Data Sequential Processor /TDSP/						
NPO-11327	B70-10720	09				

## ORTHICONS

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ORTHICONS			Two-axis flux gate magnetometer		
Neutron-image intensifier			GSFC-10441	B70-10345	01
ARG-10249	B70-10240	03	Wide-range tracking oscillator generates		
Improved optical lens system			phase and frequency coherent output		
NPO-11311	B70-10354	03	M-FS-14518	B70-10451	02
ORTHOTROPIC CYLINDERS			Color television system using single gun		
New structural approach for determining			color cathode ray tube		
load carrying capability of filament wound			ERC-10098	B70-10464	02
composite materials			Control system for an artificial heart		
M-FS-15121	B70-10408	06	LEWIS-11057	B70-10469	05
OSCILLATING FLOW			Kinetic inductance measured in a		
Controlled droplet spray generator			superconducting wire		
LEWIS-11193	B70-10652	07	ERC-10305	B70-10491	03
OSCILLATIONS			P-n junctions formed in gallium antimonide		
Mass spectrometer detects high molecular			ERC-10302	B70-10500	01
weight components			Characteristics of step-recovery-diode		
HQ-10477	B70-10057	01	frequency multipliers		
Metal cooldown, flow instability, and heat			M-FS-20558	B70-10505	01
transfer in two-phase hydrogen flow			Metal detector system		
M-FS-18696	B70-10259	04	ARC-10265	B70-10511	01
Thermally induced oscillations in fluid			Digital demodulation with data subcarrier		
flow			tracking		
M-FS-20449	B70-10299	03	NPO-10858	B70-10518	02
Effect of wall roughness on liquid			Spectral analysis of oscillation		
oscillations damping in rectangular tanks			instabilities in frequency standards		
M-FS-20799	B70-10388	06	M-FS-20778	B70-10572	02
Microbalance accurately measures extremely			Intruder detection system		
small masses			ARC-10097	B70-10638	02
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OSCILLATORS			sensitive capacitance		
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**OXYGEN SUPPLY EQUIPMENT**  
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**OXYHALIDES**  
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## PERCEPTION

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GSFC-10441 B70-10345 01

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ERC-10227 B70-10377 02

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KSC-10373 B70-10484 09

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M-FS-20823 B70-10654 08

## PHOTOGRAPHIC MEASUREMENT

Reducing streak film data via electronic  
cross correlator  
M-FS-18804 B70-10365 01

## PHOTOGRAPHS

Pulse rates recorded by digital film  
positioner  
HQ-10358 B70-10141 01

Microflora in soils of desert regions  
NPO-11215 B70-10253 05

Luminescent screen composition and  
apparatus  
ERC-10010 B70-10440 01

## PHOTOGRAPHY

Investigation of the reactivity of organic  
materials in liquid oxygen  
M-FS-20576 B70-10285 04

Stellar spectrum classifier  
MSC-13450 B70-10319 03

Variables in turbine erosion  
M-FS-18677 B70-10325 03

Electron fractography used to examine  
nickel-base alloys  
M-FS-18649 B70-10571 04

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## PIEZORESISTIVE TRANSDUCERS

<b>PHOTOIONIZATION</b>				LEWIS-11155	B70-10689	01
Photoionization mass spectrometer				<b>PHOTOSENSITIVITY</b>		
HQ-10167	B70-10113	03		Automatic optometer operates with infrared		
Improved photoionization mass spectrometer				test pattern		
LANGLEY-10180	B70-10402	04		ARC-10095	B70-10401	05
<b>PHOTOLYSIS</b>				Concept for high speed computer printer		
Compact apparatus for photogeneration of				KSC-10373	B70-10484	09
hydrated electrons				<b>PHOTOVOLTAIC CELLS</b>		
ARG-10487	B70-10036	03		Glass-to-metal bonding process improves		
<b>PHOTOMETERS</b>				stability and performance of semiconductor		
Laser altimeter				devices		
M-FS-13691	B70-10196	02		ERC-10264	B70-10477	01
Vacuum leak detector features higher				<b>PHYSICAL CHEMISTRY</b>		
sensitivity				Reactions of technetium hexafluoride with		
ERC-10034	B70-10493	03		nitric acid, nitrosyl fluoride, and		
Simple chamber facilitates chemiluminescent				nitryl fluoride		
detection of bacteria				ARG-10412	B70-10233	04
LANGLEY-10705	B70-10525	05		<b>PHYSICAL PROPERTIES</b>		
Traveling-wave photodetector has				Biological handbook for engineers		
sub-nanosecond response				M-FS-20349	B70-10255	05
GSFC-10831	B70-10641	02		Swept-frequency UHF radiometer for deep		
<b>PHOTOMETRY</b>				probes of earth - A concept		
Television camera as a scientific				MSC-13428	B70-10617	02
instrument				Low temperature uses of helium		
NPO-11164	B70-10209	03		LEWIS-11171	B70-10673	03
Regulated-current dc power supply for				Development of a silver-zinc battery system		
gaseous-discharge lamps				NPO-11444	B70-10718	02
GSFC-10293	B70-10239	02		<b>PHYSIOLOGICAL TESTS</b>		
Microflora in soils of desert regions				Human performance measuring device		
NPO-11215	B70-10253	05		LANGLEY-10679	B70-10619	05
<b>PHOTOMULTIPLIER TUBES</b>				<b>PIEZOELECTRIC CRYSTALS</b>		
Compact apparatus for photogeneration of				Magnesium oxide doping reduces acoustic		
hydrated electrons				wave attenuation in lithium metatantalate		
ARG-10487	B70-10036	03		and lithium metaniobate crystals		
Mass spectrometer detects high molecular				ERC-10463	B70-10269	03
weight components				Fabrication of electroacoustic RF		
HQ-10477	B70-10057	01		amplifiers		
Signal conditioner circuit for				ERC-10266	B70-10460	01
photomultiplier tube				<b>PIEZOELECTRIC TRANSDUCERS</b>		
XLA-10773	B70-10096	01		Piezoelectric transducer		
Electron energy analyzer				HQ-10548	B70-10157	01
HQ-10373	B70-10138	02		Sinusoidal-pressure generator for testing		
Laser altimeter				dynamic pressure probes		
M-FS-13691	B70-10196	02		LEWIS-11094	B70-10352	06
A proposed laser measurement system for				Solid state variable time delay		
determining surface contour				ERC-10032	B70-10492	01
HQ-10326	B70-10263	02		<b>PIEZOELECTRICITY</b>		
Apparatus for simultaneous ion counting and				Telemetry for impact acceleration		
current recording in mass spectrometry				measurements		
LEWIS-11103	B70-10471	03		ARC-10289	B70-10079	01
Simple chamber facilitates chemiluminescent				Prediction of faults in components of		
detection of bacteria				machinery in motion		
LANGLEY-10705	B70-10525	05		GSFC-10801	B70-10116	06
Circuit modification aids in atomic particle				Improved calibration of accelerometers at		
discrimination				temperatures down to -450 degrees F		
LEWIS-11155	B70-10689	01		M-FS-18561	B70-10173	03
<b>PHOTONS</b>				Bimorph piezoelectric device functions as		
Improved magnetron cold-cathode ion				flapper valve		
source				ERC-10082	B70-10382	01
LANGLEY-10387	B70-10023	02		Hydrodynamic squeeze-film bearings for		
Picosecond pulse measurement by two-photon				gyroscopes		
excitation of photographic film				M-FS-20802	B70-10389	07
ERC-10227	B70-10377	02		<b>PIEZORESISTIVE TRANSDUCERS</b>		
Circuit modification aids in atomic particle				New transverse piezoresistance and pinch		
discrimination				effect electromechanical transducers -		
				A concept		
				ERC-10088	B70-10075	01

## PINCH EFFECT

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## PINCH EFFECT

New transverse piezoresistance and pinch effect electromechanical transducers - A concept  
ERC-10088

B70-10075 01

## PINHOLES

Vacuum leak detector features higher sensitivity  
ERC-10034

B70-10493 03

## PINS

Test fixture insures high degree of accuracy in flexure tests  
NUC-10246

B70-10358 07

Foolproof quick-release locking pin  
M-FS-18495

B70-10409 07

Easy insert, easy release toggle bolt fastener  
ARC-10140

B70-10509 07

Disc pack cleaning table saves computer time  
LANGLEY-10590

B70-10532 09

Support for equipment - Quick mounting with quick release  
MSC-15874

B70-10542 07

Repair of brazed steel honeycomb-sandwich panels with vertical pins only  
MSC-15831

B70-10624 08

## PIPELINES

Frost as an insulator  
NUC-11039

B70-10593 03

## PIPES (TUBES)

Quantitative conversion of water to carbon dioxide  
NPO-10731

B70-10013 04

Thermal-difference compensation for structural members  
M-FS-20433

B70-10014 07

Economical weatherproof helical antenna  
XKS-08485

B70-10016 01

Mounting, support, and isolation of various components of a hydrogen maser  
HQ-10563

B70-10032 02

Adjustable flow restrictor  
MSC-13433

B70-10037 07

Split radius-form blocks for tube benders  
MSC-15773

B70-10038 08

Spinarc gas tungsten arc torch holder  
MSC-15646

B70-10041 08

Electron energy analyzer  
HQ-10373

B70-10138 02

Liquid level sensor  
M-FS-16648

B70-10219 01

Metal cooldown, flow instability, and heat transfer in two-phase hydrogen flow  
M-FS-18696

B70-10259 04

Lightweight, high-strength, reinforced plastic tube-framing die,  
LANGLEY-10126

B70-10273 04

Volumetric leak detector  
MSC-11325

B70-10302 07

Low heat-gain cryogenic-liquid transfer system  
MSC-15165

B70-10306 07

Sinusoidal-pressure generator for testing dynamic pressure probes  
LEWIS-11094

B70-10352 06

Single-phase heat transfer improved by helical inserts in tubes  
LEWIS-11063

B70-10362 07

Testing of brazed and welded connections of stainless-steel tubing  
M-FS-20806

B70-10417 08

Concept for a gas operated actuator  
NPO-11340

B70-10516 71

Replaceable filters and cones for flared-tubing connectors  
MSC-15750

B70-10548 07

Miniature spray-painting booth  
MSC-15811

B70-10549 03

Special wrench for B-nuts reduces torque stress in tubing  
MSC-15885

B70-10550 07

Electrothermal fracturing of tensile specimens  
NUC-10185

B70-10566 07

Deadweight calibration of pressure gages without contamination  
M-FS-18690

B70-10586 07

The water-cryogen heat exchanger  
NUC-11029

B70-10591 03

Toroidal mirrors provide virtual walls for breaks in light pipes  
ARC-10031

B70-10632 03

Thermocouple installation in thin-walled tubes  
LEWIS-11222

B70-10655 01

Heat-transfer data for hydrogen  
M-FS-18754

B70-10667 03

Compact electric heater  
LEWIS-11172

B70-10677 03

Compact fluid-flow restrictor  
MSC-15803

B70-10679 07

Improved method for cladding the inside of metal tubes  
LEWIS-11174

B70-10723 08

## PIPETTES

Combining micro dry column chromatography and mass spectrometry  
NPO-11240

B70-10231 03

## PISTONS

Performance-limit criteria for the design of fast-response servo-actuation systems  
LEWIS-11022

B70-10152 02

Novel valve for reciprocating compressors - Concept  
MSC-15060

B70-10160 07

Hydraulic brake safety valve  
M-FS-16444

B70-10207 07

A long-lived precision switch actuator for controlling pump-piston action  
NPO-10757

B70-10279 07

Efficient pressure-transformer for fluids  
M-FS-20830

B70-10595 07

Self-sealing, easily purged quick-disconnect hose coupling  
MSC-17009

B70-10699 07

## PITCH

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## PLATENS

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<b>PITOT TUBES</b>			<b>PLASTERS</b>		
Method of stabilizing fluoric vortex valves and vortex amplifiers LEWIS-10553	B70-10668	07	Inexpensive, removable coating for plaster tooling MSC-15819	B70-10666	04
<b>PIVOTS</b>			<b>PLASTIC COATINGS</b>		
Thermostatic expansion valve improved by dual pneumatic modulation KSC-10072	B70-10101	07	Fluid injection device for high-pressure systems MSC-15635	B70-10307	06
Easy manual operation of overhead garage doors - A concept KSC-10555	B70-10543	07	Improved cover for cadmium sulfide solar cells LEWIS-11003	B70-10584	01
Flexible pivot mount eliminates friction and hysteresis M-FS-20725	B70-10577	07	<b>PLASTIC DEFORMATION</b>		
<b>PLANAR STRUCTURES</b>			Liquid cryogenic lubricant LEWIS-11075	B70-10347	07
Improved beam-lead interconnection structure for uncased integrated circuit chips LANGLEY-10227	B70-10018	01	The mechanism of stress-corrosion cracking in 7075 aluminum alloy M-FS-18614	B70-10527	04
Array multiplier ERC-90076	B70-10047	02	<b>PLASTIC FLOW</b>		
Applications of gap welding M-FS-20715	B70-10155	08	The mechanism of stress-corrosion cracking in 7075 aluminum alloy M-FS-18614	B70-10527	04
Ambient-light-absorbing screen for front projection ERC-90017	B70-10472	03	<b>PLASTIC PROPERTIES</b>		
<b>PLANET EPHEMERIDES</b>			Flexible protection for metal bellows KSC-10520	B70-10350	06
Multibody Interplanetary Swingby Trajectories /MIST-1/ M-FS-15081	B70-10603	09	<b>PLASTICS</b>		
<b>PLANETARY ATMOSPHERES</b>			Fuse and switch functions combined within a single housing HQ-10497	B70-10003	01
Electron energy analyzer HQ-10373	B70-10138	02	Economical weatherproof helical antenna XKS-08485	B70-10016	01
New microwave spectrometer/imager has possible applications for pollution monitoring NPO-10535	B70-10187	03	Immersed ultrasonic inspection of high acoustical attenuative structures MSC-15702	B70-10055	03
<b>PLANETARY SURFACES</b>			Inflatable stretcher to transport patients HQ-10179	B70-10254	05
New microwave spectrometer/imager has possible applications for pollution monitoring NPO-10535	B70-10187	03	Remotely actuated release mechanism NPO-10698	B70-10286	01
<b>PLANETS</b>			Polyimide polymers provide improved ablative materials LEWIS-10861	B70-10300	04
Swept-frequency UHF radiometer for deep probes of earth - A concept MSC-13428	B70-10617	02	Strain gage load measuring device - A concept MSC-13385	B70-10326	01
<b>PLASMA ACCELERATORS</b>			Polyimide polymers provide higher char yield for graphitic structures LEWIS-10860	B70-10330	04
Theoretical study of a plasma accelerator NPO-11480	B70-10683	03	Nondestructive sonic testing of adhesive-bonded composites M-FS-20793	B70-10397	08
<b>PLASMA CONDUCTIVITY</b>			Elimination of gases and contamination from water KSC-10502	B70-10456	05
Plasma conductivity gage ARC-10147	B70-10510	01	Bonding of strain gages to fiber reinforced composite plastic materials LEWIS-11151	B70-10630	01
<b>PLASMA PROBES</b>			Orbit, reentry, and landing attachment for globes LANGLEY-10626	B70-10656	03
Visual display panel functions as computer input/output device ERC-10223	B70-10476	01	Strain gage installation manual M-FS-18822	B70-10715	06
Plasma conductivity gage ARC-10147	B70-10510	01	<b>PLATENS</b>		
<b>PLASMA SPRAYING</b>			A new low-expansion nonflammable printed circuit board M-FS-20408	B70-10154	01
Heat-barrier coatings for combustion chambers M-FS-18618	B70-10363	07			
<b>PLASMAS (PHYSICS)</b>					
High temperature ion source ERC-10197	B70-10379	03			
Extended-life magnetic recording heads GSFC-10097	B70-10521	01			

## PLATING

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## PLATING

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Intermolecular bonding of metals or alloys  
by thermochemical decomposition  
M-FS-13823 B70-10194 08

Contact material for pressure-sintering  
ferrites  
ERC-10213 B70-10380 01

Economical printed circuit front panel for  
computer use  
KSC-10573 B70-10560 01

Automatic, computerized testing of bolts  
NPO-11090 B70-10657 06

**PLATINUM**

Mechanism of operation of the TFE-bonded  
gas-diffusion electrode  
HQ-10536 B70-10059 01

High energy density electrochemical cell  
LEWIS-10969 B70-10151 01

Cryogenic thermocouple calibration tables  
NUC-10551 B70-10197 03

Simple, accurate temperature-measuring  
instrument  
MSC-12327 B70-10303 01

High-temperature, long-term drift of  
platinum-rhodium thermocouples  
LEWIS-11111 B70-10552 01

Accurate, rapid, temperature and  
liquid-level sensor for cryogenic tanks  
LEWIS-11208 B70-10628 03

Crystal growing by electrodeposition from  
dense gaseous solutions  
NPO-10440 B70-10676 04

**PLATINUM ALLOYS**

New electrocatalysts for hydrogen-oxygen  
fuel cells  
HQ-10537 B70-10145 01

**PLATINUM BLACK**

Nickel-silver composition shows promise as  
catalyst for hydrogen-oxygen fuel cells  
HQ-10565 B70-10035 01

New electrocatalysts for hydrogen-oxygen  
fuel cells  
HQ-10537 B70-10145 01

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tube/grid overlay method  
M-FS-14464 B70-10311 03

Hyperbola-generator for location of  
aperiodic events  
LANGLEY-10312 B70-10695 06

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and digital data plots  
LEWIS-10954 B70-10002 02

A method for rapidly evaluating the  
linearity of calibration data  
M-FS-14834 B70-10085 03

Null type instrument for simplifying two  
dimensional field plotting  
XLA-08493 B70-10192 01

Critical speed analysis of rotors  
LEWIS-11061 B70-10288 06

Simple data-smoothing and noise-suppression  
technique  
M-FS-20803 B70-10627 06

Digital simulation program improved  
M-FS-01504 B70-10705 09

**PLUGGING**

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MSC-13234 B70-10438 03

**PLUNGERS**

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M-FS-18495 B70-10409 07

Lightweight S-band helix antenna  
KSC-10392 B70-10538 02

Support for equipment - Quick mounting  
with quick release  
MSC-15874 B70-10542 07

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upon electronic instrumentation  
NPO-11217 B70-10272 03

**PLYWOOD**

The low-cost cryostat  
NUC-11034 B70-10592 03

**PNEUMATIC CONTROL**

Thermostatic expansion valve improved by  
dual pneumatic modulation  
KSC-10072 B70-10101 07

Precision control system for engine fuel  
NPO-12017 B70-10244 07

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Four-way, full-throttling valve concept  
MSC-13437 B70-10165 07

Inexpensive tamper proof safety relief  
valve  
KSC-10470 B70-10320 07

Flueric-controller pneumatic stepping  
motor system  
LEWIS-11051 B70-10332 02

Electromechanical hand incorporates touch  
sensors and trigger function  
M-FS-20812 B70-10348 07

Control system for an artificial heart  
LEWIS-11057 B70-10469 05

Bidirectional flow meter  
M-FS-18737 B70-10589 07

**PNEUMATICS**

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flapper valve  
ERC-10082 B70-10382 01

**PNEUMOGRAPHY**

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MSC-13653 B70-10697 05

**POINTING CONTROL SYSTEMS**

Flexible pivot mount eliminates friction and  
hysteresis  
M-FS-20725 B70-10577 07

**POISONS**

Three-dimensional pantograph for use in  
hazardous environments  
NUC-10222 B70-10567 07

**POISSON DENSITY FUNCTIONS**

Elimination of redundancy in telemetered  
data  
HQ-10585 B70-10431 06

**POISSON RATIO**

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pressure for thin shells  
KSC-10515 B70-10582 06

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Electronic scanning of 2-channel monopulse patterns			New type of nonflammable paper	B70-10546	04
GSFC-10299	B70-10485	02	MSC-13432		
<b>POLAR GASES</b>			Low-temperature radiation-resistant material for ball-bearing retainers	B70-10576	04
Simple method for predicting viscosity of gas mixtures			NUC-10058		
LEWIS-11060	B70-10361	04	<b>POLYCARBONATES</b>		
<b>POLARISCOPES</b>			Photochromism of dihydroquinolines	B70-10574	04
A method for the visual detection of holes in thin polymeric films			HQ-10574		
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HQ-10230	B70-10024	01	<b>POLYESTER RESINS</b>		
Precision full-wave rectifier			Reinforcement of polymeric structures with asbestos fibrils	B70-10020	03
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Oxygen-hydrogen fuel cell with an iodine-iodide cathode - A concept			<b>POLYETHER RESINS</b>		
HQ-10379	B70-10246	02	Nonflammable organic adhesives effective over wide temperature range	B70-10644	04
<b>POLARIZATION (WAVES)</b>			MSC-13586		
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A method for the visual detection of holes in thin polymeric films			Shelf and cycle life evaluation of silver-zinc cells	B70-10214	01
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ERC-10214	B70-10443	01	Hydrogen maser - Measurement of wall shift with a flexible bulb	B70-10441	03
<b>POLARIZERS</b>			HQ-10552		
Radiometric evaluation of antenna-feed component losses			Preparation of thin polymer films for infrared reaction rate studies	B70-10551	04
NPO-11238	B70-10344	02	MSC-15893		
Interferometer for measurement of optical polarization			<b>POLYGONS</b>		
NPO-11239	B70-10405	03	Nondestructive assessment of penetration of electron-beam welds	B70-10466	08
<b>POLISHING</b>			MSC-15955		
Technique for depositing silicon dioxide on indium arsenide improves adhesion			<b>POLYIMIDE RESINS</b>		
ERC-10130	B70-10475	04	A new low-expansion nonflammable printed circuit board	B70-10154	01
Less-expensive Rochon prisms			M-FS-20408		
M-FS-20554	B70-10681	03	Polyimide polymers provide improved ablative materials	B70-10300	04
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Chemical treatment makes aromatic polyamide fabric fireproof in oxygen atmosphere					

## POLYIMIDES

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Soluble high molecular weight polyimide resins LEWIS-11056	B70-10504	04	Filled polymers for bearings and seals used in liquid hydrogen LEWIS-10887	B70-10573	04
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A method for the visual detection of holes in thin polymeric films LEWIS-10876	B70-10027	04	Water surface depth instrument LANGLEY-10576	B70-10103	07
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<b>POLYMER CHEMISTRY</b>			High energy density electrochemical cell LEWIS-10969	B70-10151	01
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## POTASSIUM HYDROXIDES

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GSFC-10293 B70-10239 02

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HQ-10486 B70-10433 06

**ROTOR SPEED**  
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LEWIS-11061 B70-10288 06

Dynamic balancing of high-speed rotary  
machinery  
HQ-10486 B70-10433 06

**ROTORS**  
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Critical speed analysis of rotors  
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Ultrastable reference pulser for high-resolution spectrometers				<b>SPOOLS</b>	
ARG-10364	B70-10216	01		Computer program for the design of axial-flow turbines	
Airborne spectrometer senses several gases				LEWIS-11029	B70-10669 09
MSC-13234	B70-10438	03		<b>SPRAY NOZZLES</b>	
<b>SPECTROPHOTOMETERS</b>				Spray momentum measuring equipment	
Laser wavelength selector and output coupler				MSC-12305	B70-10224 06
ERC-10248	B70-10507	02		<b>SPRAYED COATINGS</b>	
<b>SPECTRORADIOMETERS</b>				Sonic impedance technique detects flaws in polyurethane foam spray-on insulation	
Spectral emission measurement of igneous rocks using a spectroradiometer				M-FS-20561	B70-10012 06
M-FS-20837	B70-10661	04		Strain compatibility tests for sprayed foam cryogenic insulation	
<b>SPECTROSCOPIC ANALYSIS</b>				M-FS-16063	B70-10423 04
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ERC-10227	B70-10377	02		Inexpensive, removable coating for plaster tooling	
Interferometer for measurement of optical polarization				MSC-15819	B70-10666 04
NPO-11239	B70-10405	03		<b>SPRAYERS</b>	
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BORN, G. H.	Derivation of a general perturbation solution - Its application to determination of orbit MSC-13377	B70-10442	03
BOSSLER, R. B., JR.	Mechanical characteristics of the Bossler coupling HQ-10508	B70-10072	07
BOSWORTH, R. H.	Carriage-rail assembly for high-resolution mechanical positioning M-FS-20908	B70-10714	07
BOUDREAU, E. J.	Rugged, low-conductance, heat-flow probe MSC-13443	B70-10622	03
BOWER, K. F.	Digital input is buffered to real-time analog display KSC-10397	B70-10562	01
BOYD, C. C.	Expanded sun-look angle program MSC-13176	B70-10602	09
BOYER, K.	The water-cryogen heat exchanger NUC-11029	B70-10591	03
BRACE, D. F.	Spinarc gas tungsten arc torch holder MSC-15646	B70-10041	08
BRAGG, K.	X-connectors for tubing - Feasibility study M-FS-20827	B70-10418	07
BRAMBLETT, E. K.	Digital simulation program improved M-FS-01504	B70-10705	09
BRAWNER, E.	Color identification testing device KSC-10278	B70-10264	01
BREITWIESER, R.	Load cell for thermionic converter tests LEWIS-11068	B70-10470	01
BRENNER, M. W.	Thermal treatment and mechanical properties of aluminum-2021 M-FS-20559	B70-10369	04
BRENNER, D.	Hydrogen maser - Measurement of wall shift with a flexible bulb HQ-10552	B70-10441	03
BRENNER, R.	Ultrastable reference pulser for high-resolution spectrometers ARG-10364	B70-10216	01
BRINKMAN, K. L.	COPTRAN - A method of optimum communication systems design ERC-10273	B70-10501	09
BROCKER, D. H.	Global search algorithm for optimal control ARC-10359	B70-10637	09
BRODER, J. D.	Improved protection for silicon solar cells LEWIS-11065	B70-10706	08
BROKAW, R. S.	Simple method for predicting viscosity of gas mixtures LEWIS-11060	B70-10361	04
BROWSON, J. C.	The low-cost cryostat NUC-11034	B70-10592	03
	Frost as an insulator NUC-11039	B70-10593	03
BROOKS, J.	Stranded superconducting cable of improved design ARG-90108	B70-10070	01
BROOKS, R. E.	Multipass holographic interferometer improves image resolution HQ-10499	B70-10426	03
BROUSSARD, P., JR.	Technique for improving hydrodynamic gyro bearings M-FS-20764	B70-10301	06
BROWN, G. V.	Low temperature uses of helium LEWIS-11171	B70-10673	03
BROWN, R. L.	Detection and location of metal fragments in the human body M-FS-14797	B70-10107	05
BROWN, W.	Radiometric absolute noise-temperature measurement system features improved accuracy and calibration ease ERC-90066	B70-10376	01
BRUMMER, S. B.	Increased resistance to stress corrosion of aluminum alloys M-FS-20788	B70-10396	04
BUCK, A. P.	Elimination of gases and contamination from water KSC-10502	B70-10456	05
BUFFUM, R. D.	Improved calibration of accelerometers at temperatures down to -450 degrees F M-FS-18561	B70-10173	03
BUGG, P. M.	Effect of wall roughness on liquid oscillations damping in rectangular tanks M-FS-20799	B70-10388	06
BULLINGER, H.	Multilayer screen gives cathode ray tube high contrast ERC-10217	B70-10454	01
BURCH, J. L.	Two-speed wheel-drive system without lubrication M-FS-20645	B70-10193	07
	Technique for improving hydrodynamic gyro bearings M-FS-20764	B70-10301	06
BURCHER, E. E.	Multispectral facsimile reproducer LANGLEY-10618	B70-10360	03
BURNETT, G. J.	Concept for a distributed processor computer ERC-10271	B70-10481	02
BURNHAM, D. C.	Picosecond pulse measurement by two-photon excitation of photographic film ERC-10227	B70-10377	02
	Thermal tuning of organic dye lasers ERC-10187	B70-10480	02
BURNS, E. A.	Polyimide polymers provide improved ablative		

materials LEWIS-10861	B70-10300	04	Simple bonding technique for high-temperature ceramic coatings LEWIS-11085	B70-10580	08
Polyimide polymers provide higher char yield for graphitic structures LEWIS-10860	B70-10330	04	CARPINI, T. D. Gage for measuring coastal erosion and sedimentation LANGLEY-10779	B70-10629	01
BURROUS, C. N. Laser beam hydrocarbon detector ARC-10156	B70-10631	03	CARRIKER, J. W. Long life, low cost ball valve, with lifted seals and cartridge type construction MSC-13430	B70-10653	07
A new solid-state logarithmic radiometer ARC-10287	B70-10633	02	CARROLL, C. C. Two techniques for digital filter design M-FS-20015	B70-10314	01
BURWELL, D. Calorimeter measures high nuclear heating rates and their gradients across a reactor test hole NUC-10227	B70-10356	03	CARSON, W. N., JR. Electrodeposited inorganic separators for alkaline batteries GSFC-10943	B70-10462	01
BUSH, S. Lightweight, high-strength, reinforced plastic tube-franging die LANGLEY-10126	B70-10273	04	CARTER, A. F. Computer program for the design of axial-flow turbines LEWIS-11029	B70-10669	09
BYRNE, J. J. High energy density electrochemical cell LEWIS-10969	B70-10151	01	CARUSO, A. J. Sorption vacuum trap ERC-90051	B70-10449	06
<b>C</b>					
CAHILL, J. B. Testing of brazed and welded connections of stainless-steel tubing M-FS-20806	B70-10417	08	CASELDINE, H. Lightweight, high-strength, reinforced plastic tube-franging die LANGLEY-10126	B70-10273	04
CALIHAN, C. Laser scribing of silicon wafers ERC-10386	B70-10437	01	CASSIDY, J. F. Measurement of surface roughness slope LEWIS-11080	B70-10722	01
CAMERON, H. Hydrogen-oxygen powered internal combustion engine LEWIS-90264	B70-10610	07	CATLEDGE, C. G. Formulas establish audio range inductance in beryllium coils M-FS-14244	B70-10281	02
CAMERON, R. E. Microflora in soils of desert regions NPO-11215	B70-10253	05	CATTABRIGA, R. A. Several new catalysts for reduction of oxygen in fuel cells HQ-10452	B70-10021	01
CAMP, F. E. High expansion coefficient glasses can be sealed to common metals LEWIS-10698	B70-10429	08	New electrocatalysts for hydrogen-oxygen fuel cells HQ-10537	B70-10145	01
CAMPBELL, W. E. Twin-spool turbopumps for **low** net positive suction pressure operations LEWIS-11105	B70-10671	07	CAUSTIN, E. L. Nondestructive sonic testing of adhesive-bonded composites M-FS-20793	B70-10397	08
CANADY, K. S. Thin film devices used as oxygen partial pressure sensors XLA-06473	B70-10419	04	CAVICCHI, R. H. Critical speed analysis of rotors LEWIS-11061	B70-10288	06
CANCRO, C. A. Wide-range pulse-height discriminator GSFC-10837	B70-10053	01	CELLIER, A. Signal conditioner circuit for photomultiplier tube XLA-10773	B70-10096	01
Switching circuits with fast response and low power drain GSFC-10878	B70-10250	01	CESSNA, J. R. RC filter with low distributed capacitance provides 60 db isolation at 500 MHz GSFC-10983	B70-10664	02
CANTWELL, W. Tandem wheel drop-legs for standard truck trailer M-FS-13466	B70-10088	07	CHAMBERLAIN, D. Investigation of the reactivity of organic materials in liquid oxygen M-FS-20576	B70-10285	04
CAPLETTE, R. K. Constant-voltage drive current-steering switch NPO-10743	B70-10046	01	CHAMBERLAIN, R. G. Separation of two bodies in space NPO-10663	B70-10625	09
CARDWELL, R. O. Chemical treatment makes aromatic polyamide fabric fireproof in oxygen atmosphere MSC-13571	B70-10540	04	CHAMBERLAIN, W. W., II Support for equipment - Quick mounting with quick release MSC-15874	B70-10542	07
CAREY, C. Ultrasonic propagation in gases at high temperatures HQ-10498	B70-10137	03	CHAMIS, C. C. Bonding of strain gages to fiber reinforced composite plastic materials LEWIS-11151	B70-10630	01
CARLUCCI, J., JR. Automatic, computerized testing of bolts NPO-11090	B70-10657	06	CHAMPAN, J. W. High expansion coefficient glasses can be sealed to common metals LEWIS-10698	B70-10429	08
CARNEVALE, E. H. Ultrasonic propagation in gases at high temperatures HQ-10498	B70-10137	03	CHANDLER, W. T. Effects of high pressure hydrogen on metals M-FS-18612	B70-10162	04
CARON, P. R. Phase interpolation circuits using frequency multiplication for phased arrays ERC-10285	B70-10457	02	Low-temperature embrittlement of Ti-6Al-4V and Inconel-718 by high pressure hydrogen M-FS-18753	B70-10364	04
CARPENTER, H. W. Heat-barrier coatings for combustion chambers M-FS-18618	B70-10363	07	Effects of hydrogen on ELI titanium alloy Ti-5Al-2.5Sn M-FS-18815	B70-10366	04

CHANG, C. S.	test hole		
Nonlinear damping in structures	NUC-10227	B70-10356	03
M-FS-20701			
CHAPMAN, J. W.	COPELAND, E. J.		
High temperature glass coatings for	Fluid injection device for high-pressure		
superalloys and refractory metals	systems		
LEWIS-10700	MSC-15635	B70-10307	06
CHARLTON, K. W.	COPELAND, J. T., JR.		
An electrothermally actuated micro valve	Electro-optical time marker for high-speed		
NPO-10730	cameras		
CHIANG, T.	KSC-10294	B70-10229	01
Hydrodynamic squeeze-film bearings for	COPPS, E. M.		
gyroscopes	Microprogram scheme for automatic recovery		
M-FS-20802	from computer error		
CIKANEK, H. A., JR.	MSC-13387	B70-10642	09
Optical probing of supersonic aerodynamic	CORNSWEET, T. N.		
turbulence	Automatic optometer operates with infrared		
M-FS-20686	test pattern		
CLARK, C. C.	ARC-10095	B70-10401	05
Inflatable stretcher to transport patients	Visual focus stimulator aids in study of		
HQ-10179	the eye's focusing action		
CLAUSS, R. C.	ARC-10049	B70-10568	05
A simple tester provides resonant frequency	COUVILLON, L. A.		
measurements of ferrite devices	Digital phase-modulation/multiplex system		
NPO-10678	NPO-11338	B70-10355	02
CLEW, R. D.	COVENTRY, J. H.		
Astronaut Rescue Air Pack /ARAP/ and	Adjustable drill bar replaces complex jigs		
Emergency Egress Air Pack /EEAP/	MSC-15624	B70-10547	07
KSC-10522	COWFER, C. D.		
CLOUGH, R.	Electronic flaw simulator for eddy current		
Growth of single-crystal gallium nitride	probe calibration		
ERC-10301	NUC-10211	B70-10533	01
Visible light electroluminescent diodes of	Three-dimensional pantograph for use in		
indium-gallium phosphide	hazardous environments		
ERC-10303	NUC-10222	B70-10567	07
P-n junctions formed in gallium antimonide	CRANE, H. D.		
ERC-10302	Automatic optometer operates with infrared		
COBIN, J. C.	test pattern		
High-powered automatic latching device	ARC-10095	B70-10401	05
MSC-15474	Visual focus stimulator aids in study of		
COCKS, F. H.	the eye's focusing action		
Increased resistance to stress corrosion	ARC-10049	B70-10568	05
of aluminum alloys	CREMER, H. C.		
M-FS-20788	Improved low cost ac-to-dc converter		
COE, H. H.	NPO-11055	B70-10076	01
Drilled ball bearings - An approach to	CRIBB, H. E.		
extending bearing fatigue life at high	Economical weatherproof helical antenna		
speeds	XKS-08485	B70-10016	01
LEWIS-10856	Self-contained miniature electronics		
COHEN, E. A.	transceiver provides voice communication		
Precise audio-frequency markers for nuclear	in hazardous environment		
magnetic resonance spectra	KSC-10164	B70-10335	01
NPO-11147	Lightweight S-band helix antenna		
COHN, E. M.	KSC-10392	B70-10538	02
Fuse and switch functions combined within	CROCKETT, J. L.		
a single housing	Spinarc gas tungsten arc torch holder		
HQ-10497	MSC-15646	B70-10041	08
Several new catalysts for reduction of	CROFT, W.		
oxygen in fuel cells	Magnesium oxide doping reduces acoustic		
HQ-10452	wave attenuation in lithium metatantalate		
COLEMAN, L. F.	and lithium metaniobate crystals		
Commutating brushes tested in dc motors	ERC-10463	B70-10269	03
in dry argon atmospheres	CROSS, B. T.		
ARG-10243	Ultrasonic detection of flaws in fusion		
COLLINS, F. A.	butt welds		
Design and evaluation of brushless electrical	M-FS-20824	B70-10514	08
generators	CROSS, D. A.		
LEWIS-10124	A vapor barrier for cold testing printed		
CONE, C. D., JR.	circuit cards		
Absolute focus lock for microscopes	M-FS-15115	B70-10172	01
LANGLEY-10184	CROW, R. B.		
CONRAD, E. W.	Signal phase switches offer greater		
Resonance tube igniter	dynamic range		
LEWIS-11219	NPO-10709	B70-10393	01
CONRAGAN, J.	CUBLEY, H. D.		
Piezoelectric transducer	Antenna-array, phase quadrature tracking		
HQ-10548	system		
CONSIGLIO, J. A.	MSC-12205	B70-10095	02
Electrodeposited inorganic separators for	CURREN, A. N.		
alkaline batteries	Thermocouple installation in thin-walled		
GSFC-10943	tubes		
COOL, T. A.	LEWIS-11222	B70-10655	01
Fluid mixing technique increases the gain	CUTLER, L.		
and output power of carbon dioxide laser	Mounting, support, and isolation of various		
systems	components of a hydrogen maser		
HQ-10389	HQ-10563	B70-10032	02
COOMBE, J. R.			
Calorimeter measures high nuclear heating			
rates and their gradients across a reactor			

## D

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|------------------|---|-----------|----|
| DAMERON, C. E.   | Null type instrument for simplifying two dimensional field plotting<br>XLA-08493  | B70-10192 | 01 |
| DAMJANOVIC, A.   | Suppression of zinc dendrites in zinc electrode power cells<br>HQ-10550   | B70-10434 | 02 |
| DAMON, R.        | Magnesium oxide doping reduces acoustic wave attenuation in lithium metatantalate and lithium metaniobate crystals<br>ERC-10463 | B70-10269 | 03 |
| DANE, D. H.      | Electromechanical hand incorporates touch sensors and trigger function<br>M-FS-20812  | B70-10348 | 07 |
| DARKOW, G. L.    | Inexpensive net solar flux radiometer<br>HQ-10087   | B70-10296 | 03 |
| DAVENPORT, G. K. | System availability management technique for reliability and maintainability analysis<br>KSC-10315                              | B70-10063 | 09 |
| DAVERN, W. E.    | New method for photoresist stripping<br>ERC-10239   | B70-10497 | 04 |
| DAVIS, D. A.     | Multibody Interplanetary Swingby Trajectories /MIST-1/<br>M-FS-15081  | B70-10603 | 09 |
| DAVIS, D. P.     | Umbilical disconnect actuator<br>NPO-11202  | B70-10170 | 07 |
| DAVIS, J. P.     | Compact, electromagnetic multiple-stream pump for liquid metals - Design concept<br>NPO-10755                                   | B70-10090 | 07 |
| DAVIS, J. W.     | Short-duration, transonic flow, variable-porosity test section<br>M-FS-20509  | B70-10256 | 03 |
| DAVIS, Q. C., IV | Water surface depth instrument<br>LANGLEY-10576   | B70-10103 | 07 |
| DAVIS, R. R.     | A long-lived precision switch actuator for controlling pump-piston action<br>NPO-10757  | B70-10279 | 07 |
| DE CARLO, T. A.  | Improved calibration of accelerometers at temperatures down to -450 degrees F<br>M-FS-18561                                     | B70-10173 | 03 |
| DE WITT, R. L.   | Accurate, rapid, temperature and liquid-level sensor for cryogenic tanks<br>LEWIS-11208   | B70-10628 | 03 |
| DEBOO, G. J.     | Precision full-wave rectifier<br>ARC-10101  | B70-10161 | 02 |
|                  | A self-tuning filter<br>ARC-10264   | B70-10337 | 01 |
|                  | A new solid-state logarithmic radiometer<br>ARC-10287   | B70-10633 | 02 |
| DECKERT, J. C.   | Method of statistical filtering<br>MSC-13493  | B70-10427 | 06 |
| DEMOREST, K. E.  | Comparison of release torques of tightened bolts in vacuum and air<br>M-FS-20773  | B70-10395 | 06 |
| DENGLER, R. P.   | Lightweight, self-evacuated insulation panels<br>LEWIS-90361  | B70-10646 | 03 |
| DERVAGE, M. M.   | Automated validation of a computer operating system<br>M-FS-14510   | B70-10257 | 09 |
| DESAU, P. O.     | Low-temperature radiation-resistant material for ball-bearing retainers<br>NUC-10058  | B70-10576 | 04 |
| DETER, K.        | High-strength magnetic materials<br>LEWIS-10697   | B70-10596 | 03 |
| DICKERSON, R. A. | Reducing streak film data via electronic cross correlator   |           |    |

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| M-FS-18804   | B70-10365 | 01 |
| DIETRICH, M. W.  |           |    |
| Liquid cryogenic lubricant   |           |    |
| LEWIS-11075  | B70-10347 | 07 |
| DIGGLE, J. W.  |           |    |
| Suppression of zinc dendrites in zinc electrode power cells                                    |           |    |
| HQ-10550   | B70-10434 | 02 |
| DIMINO, J. M.  |           |    |
| Inexpensive, removable coating for plaster tooling   |           |    |
| MSC-15819  | B70-10666 | 04 |
| DOLAND, G. D.  |           |    |
| Improved convolutional coding  |           |    |
| MSC-13625  | B70-10698 | 09 |
| DOWNER, H. C.  |           |    |
| Measurement of surface roughness slope   |           |    |
| LEWIS-11080  | B70-10722 | 01 |
| DOTSON, W. P., JR.   |           |    |
| The effect of object motion in Fraunhofer holography with application to velocity measurements |           |    |
| MSC-12295  | B70-10268 | 03 |
| DOUBT, L. S.   |           |    |
| Two terminal current limiter   |           |    |
| NPO-11350  | B70-10232 | 01 |
| DOW, N. F.   |           |    |
| Testing filamentary composites   |           |    |
| HQ-10268   | B70-10004 | 04 |
| Unidirectional composite stiffening  |           |    |
| HQ-10266   | B70-10054 | 04 |
| Design and evaluation of three-phase fibrous composite structures                              |           |    |
| HQ-10267   | B70-10205 | 04 |
| DOWDY, M. W.   |           |    |
| Experimental investigation and analysis of two sources of nozzle-thrust misalignment           |           |    |
| NPO-11355  | B70-10406 | 06 |
| DRAWBAUGH, D. W.   |           |    |
| Single-level resonance parameters fit nuclear cross-sections                                   |           |    |
| NUC-10101  | B70-10686 | 03 |
| DRYLIE, C. D.  |           |    |
| Circuit minimizes current drain caused by neon indicator lamps                                 |           |    |
| NUC-10157  | B70-10534 | 01 |
| DUDEK, E. F., JR.  |           |    |
| Systems approach provides management control of complex programs                               |           |    |
| M-FS-20791   | B70-10647 | 06 |
| DUNNAVANT, W. R.   |           |    |
| Improved process for synthesizing anilinosilane compounds                                      |           |    |
| M-FS-14948   | B70-10105 | 04 |
| DURAN, E. M.   |           |    |
| Test fixture insures high degree of accuracy in flexure tests                                  |           |    |
| NUC-10246  | B70-10358 | 07 |
| DUSTIN, M. O.  |           |    |
| Flueric-controller pneumatic stepping motor system   |           |    |
| LEWIS-11051  | B70-10332 | 02 |
| DUTY, R. L.  |           |    |
| Simple data-smoothing and noise-suppression technique  |           |    |
| M-FS-20803   | B70-10627 | 06 |
| DYES, W. A.  |           |    |
| Holographic photography of high velocity particles   |           |    |
| ERC-10318  | B70-10371 | 03 |

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| ECKHARDT, W. O.                              |           |    |
| Vapor feeding of liquid metal cathodes       |           |    |
| HQ-10213                                     | B70-10168 | 03 |
| EDMISTON, W. B.                              |           |    |
| Metal drilling with portable hand drills     |           |    |
| M-FS-15180                                   | B70-10594 | 08 |
| EDWARDS, R. N.                               |           |    |
| High temperature circuit breaker             |           |    |
| LEWIS-90265                                  | B70-10721 | 01 |
| ELLENBURG, G. W.                             |           |    |
| Test fixture insures high degree of accuracy |           |    |
| in flexure tests                             |           |    |
| NUC-10246                                    | B70-10358 | 07 |
| ELLIOTT, J. J.                               |           |    |
| Digital program analyzes supersonic flow     |           |    |
| field within bell-shaped rocket nozzles      |           |    |



- M-FS-14292 B70-10597 09  
 ELLIS, J. N.  
 Design and evaluation of brushless electrical  
 generators  
 LEWIS-10124 B70-10554 02  
 ELSER, M. J.  
 Volumetric leak detector  
 MSC-11325 B70-10302 07  
 EMMONS, W. F.  
 Low-temperature radiation-resistant material  
 for ball-bearing retainers  
 NUC-10058 B70-10576 04  
 ENGLUND, R., JR.  
 Sinusoidal-pressure generator for testing  
 dynamic pressure probes  
 LEWIS-11094 B70-10352 06  
 ERBE, C. J.  
 Volume-checking tool  
 KSC-10514 B70-10502 07  
 ERWIN, L. R.  
 Method of stabilizing fluoric vortex valves  
 and vortex amplifiers  
 LEWIS-10553 B70-10668 07  
 ESTES, M. F.  
 Synthesis of diamonds  
 M-FS-20698 B70-10513 08  
 EVENSEN, H. A.  
 Improvement of adhesive-bonded structural  
 joints  
 M-FS-20876 B70-10663 08  
 EWEN, H.  
 Radiometric absolute noise-temperature  
 measurement system features improved  
 accuracy and calibration ease  
 ERC-90066 B70-10376 01
- F**
- FAGER, C. A., JR.  
 Post-operative cranial pressure monitoring  
 system  
 ERC-10336 B70-10436 05  
 FARRELL, W. T.  
 Motor brush wear measured with strain gages  
 GSFC-10886 B70-10266 01  
 FEE, K. W.  
 Miniature spray-painting booth  
 MSC-15811 B70-10549 03  
 FERGERSON, P. O.  
 Improved linings for integrating spheres  
 MSC-12237 B70-10413 03  
 FERRELL, S., JR.  
 A battery simulator  
 KSC-10172 B70-10340 01  
 FERRI, A.  
 Integrated turbine-compressor provides air  
 flow for cooling  
 HQ-10442 B70-10295 07  
 FERRY, R. T.  
 Electrical test wire attachment device  
 KSC-10562 B70-10488 01  
 FIET, O. O.  
 Bistable fluidic valve is electrically  
 switched  
 NPO-10416 B70-10517 07  
 FIEWEGER, R.  
 Long life, low cost ball valve, with lifted  
 seals and cartridge type construction  
 MSC-13430 B70-10653 07  
 FIFE, W. J.  
 Controlled release of free-falling test  
 models  
 NPO-11314 B70-10077 07  
 FINGERHOOD, C. R.  
 Detonation hazards with \*\*safe\*\* industrial  
 solvents  
 LANGLEY-10299 B70-10404 04  
 FISCHBACH, D. B.  
 Tensile creep-rate of pyrolytic carbon  
 NPO-11254 B70-10100 04  
 FISCHER, M. C.  
 Low temperature ablation models made by  
 pressure/vacuum application  
 LANGLEY-10676 B70-10578 04  
 FISCHER, R.  
 Electronic position indicator for latching  
 solenoid valves  
 LEWIS-10926 B70-10174 01
- FISH, R. H.  
 Intumescent coatings as fire retardants  
 ARC-10099 B70-10450 04  
 FITZ, P. A.  
 Passive heat transfer control  
 HQ-10041 B70-10111 03  
 FITZGERALD, T. M.  
 Solid state variable time delay  
 ERC-10032 B70-10492 01  
 FLAHERTY, R.  
 Thermally cascaded thermoelectric generator  
 NPO-10753 B70-10280 03  
 FLEISCHMANN, C. W.  
 Improved alkaline electrochemical cell  
 GSFC-10792 B70-10153 01  
 FOHLEN, G. M.  
 Intumescent coatings as fire retardants  
 ARC-10099 B70-10450 04  
 FONDRIE, D. G.  
 Ground computer test trap  
 KSC-10574 B70-10561 09  
 FONTES, M. J.  
 Molding procedure for casting a variety of  
 alloys  
 ARC-10358 B70-10512 08  
 FORD, O. I.  
 Twin-spool turbopumps for \*\*low\*\* net  
 positive suction pressure operations  
 LEWIS-11105 B70-10671 07  
 FORD, W.  
 Control of equilibrium pressure-temperature  
 conditions in cryogenic storage  
 M-FS-18115 B70-10122 03  
 FORMAN, R.  
 Stainless steel 301 and Inconel 718  
 hydrogen embrittlement  
 MSC-13557 B70-10621 04  
 FOSTER, J. F.  
 Improved apparatus for continuous culture of  
 hydrogen-fixing bacteria  
 HQ-09000 B70-10001 05  
 FOSTER, J. N.  
 Properties of nonaqueous electrolytes  
 LEWIS-11017 B70-10080 04  
 FOSTER, S. D.  
 Effect of heat treatment and surface  
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KIMBLE, K. G.						
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KIMMEL, M.						
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KINSEY, J. C.						
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KIRSHEN, M.						
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M-FS-20576	B70-10285	04				
KLOEZEMAN, W. G.						
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KNIAZZEH, A. G. F.						
Thermionic triode generates ac power						
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KOCZELA, L. J.						
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KOEPKE, B. G.						
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LA VIGNA, T.	Buck-boost dc voltage regulator		
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LAHR, W.	A battery simulator		
KSC-10172		B70-10340	01
LAHTI, G. P.	A computer program for evaluating propellant heating and radiation dosage to crews of nuclear-powered rocket vehicles		
LEWIS-10951		B70-10648	01
LAMNECK, J. H., JR.	Determination of diffusion lengths in silicon by an X-ray method		
LEWIS-10984		B70-10150	01
LANDIS, A. L.	New hyperthermal thermosetting heterocyclic polymers		
LANGLEY-10221		B70-10403	04
LANG, E. J.	Low-cost orbiting grinder for cutting ducts		
M-FS-20684		B70-10126	07
LANGE, D. R.	Split radius-form blocks for tube benders		
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LANZO, C. D.	A stabilized low-frequency alternating-current electric arc		
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LARSON, S. G.	Ferrite attenuator modulation improves		

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MAC GLASHAN, W. F., JR.	Surface treatment for valve seats	NPO-10779	B70-10202	08	MARTINEZ, J.	Improved burst disk/cutter assembly	KSC-10516	B70-10583	07
HACK, T. H.	Jettisoning system for a parachute*s canister	NPO-11236	B70-10398	06	MARTS, E. C.	Simple chamber facilitates chemiluminescent detection of bacteria	LANGLEY-10705	B70-10525	05
MACOMBER, G. A.	A conceptual current surge protector for incandescent lamps	M-FS-16658	B70-10483	01	MASSEY, G. A.	Laser method for finding axis of rotation	ARC-10388	B70-10439	03
MACOSKO, R. P.	Compact electric heater	LEWIS-11172	B70-10677	03		Less-expensive Rochon prisms	M-FS-20554	B70-10681	03
MAGEE, R. L.	Solid state switch provides high input-to-output isolation	HQ-10488	B70-10022	01	MATHISON, R.	Telemetry receiver	NPO-10746	B70-10008	02
MAGERL, J. A.	Nickel-silver composition shows promise as catalyst for hydrogen-oxygen fuel cells	HQ-10565	B70-10035	01	MATICA, S. W.	Improved mechanical remote control assembly - Concept	M-FS-16249	B70-10144	07
MAILLOUX, R. J.	Circularly polarized antenna with wide projection and range - A concept	ERC-10214	B70-10443	01		Liquid level sensor	M-FS-16648	B70-10219	01
MAILLOUX, R. S.	Phase interpolation circuits using frequency multiplication for phased arrays	ERC-10285	B70-10457	02	MATTAUCH, R. J.	Composite metal-oxide device has voltage sensitive capacitance	HQ-10594	B70-10687	01
MAKRIDES, A. C.	Several new catalysts for reduction of oxygen in fuel cells	HQ-10452	B70-10021	01	MATTING, F. W.	Analysis of surface ablation of noncharring materials	ARC-10223	B70-10615	09
MALMBERG, J.	Waveform simulator synthesizes complex functions	NPO-10251	B70-10128	02	MATTOX, D. M.	High temperature glass coatings for superalloys and refractory metals	LEWIS-10700	B70-10430	08
MANATT, S. L.	Precise audio-frequency markers for nuclear magnetic resonance spectra	NPO-11147	B70-10086	02	MATTSON, W. F.	Improved method for cladding the inside of metal tubes	LEWIS-11174	B70-10723	08
MANISTA, E. J.	Load cell for thermionic converter tests	LEWIS-11068	B70-10470	01	MAUDLIN, D. G.	Contourograph display system for monitoring electrocardiograms	MSC-13407	B70-10030	05
MANJOINE, M. J.	Friction characteristics of graphite and graphite-metal combinations at various temperatures	NUC-10151	B70-10467	04	MAXWELL, P. T.	Fuse and switch functions combined within a single housing	HQ-10497	B70-10003	01
MANSON, L.	Metal cooldown, flow instability, and heat transfer in two-phase hydrogen flow	M-FS-18696	B70-10259	04	MAYERJAK, R. J.	Mechanical characteristics of the Bossler coupling	HQ-10508	B70-10072	07
MARKLE, R. A.	Improved process for synthesizing anilinosilane compounds	M-FS-14948	B70-10105	04	MC BRIDE, J.	Calorimeter measures high nuclear heating rates and their gradients across a reactor test hole	NUC-10227	B70-10356	03
MARKS, A. M.	Optically activated magnetic recording tape	GSFC-10275	B70-10247	01	MC CABE, B. J.	Holographic photography of high velocity particles	ERC-10318	B70-10371	03
MARLEY, D.	Pilot-booster control valve	M-FS-20635	B70-10558	07	MC CARTHY, J. F., JR.	Systems approach provides management control of complex programs	M-FS-20791	B70-10647	06
MARLEY, J.	Improved beam-lead interconnection structure for uncased integrated circuit chips	LANGLEY-10227	B70-10018	01	MC CARTHY, J. R.	Heat-transfer data for hydrogen	M-FS-18754	B70-10667	03
MARTIN, R.	Color identification testing device	KSC-10278	B70-10264	01	MC CARTY, R. D.	Uniform data system standardizes technical computations and the purchasing of commercially important gases	NUC-10549	B70-10333	04
MARTIN, R. R.	Inexpensive, removable coating for plaster tooling	MSC-15819	B70-10666	04	MC CULLOUGH, J. E.	Rugged, low-conductance, heat-flow probe	MSC-13443	B70-10622	03
MARTIN, W. L.	Communications link for SDS 900 series computers	NPO-11161	B70-10163	02	MC DOUGAL, A. R.	Umbilical disconnect actuator	NPO-11202	B70-10170	07
MARTINDALE, D. L.	Analytical prediction of reverse buckling pressure for thin shells				MC DOWALL, J.	Airborne spectrometer senses several gases	MSC-13234	B70-10438	03
					MC FADIN, L. W.	Simple, accurate temperature-measuring instrument	MSC-12327	B70-10303	01
					MC FALL, R. H.	Method of stabilizing fluoric vortex valves and vortex amplifiers	LEWIS-10553	B70-10668	07



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MC KINNEY, B. G.			
Water-filled heat pipe useful at moderate temperatures			
M-FS-20543	B70-10106	03	
MC LEOD, A.			
Nonflammable organic adhesives effective over wide temperature range			
MSC-13586	B70-10644	04	
MC NEILL, R. E.			
A vapor barrier for cold testing printed circuit cards			
M-FS-15115	B70-10172	01	
MC QUADE, J. M.			
Electrodeposited inorganic separators for alkaline batteries			
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MEE, C., III			
Information retrieval system			
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MEISSNER, H.			
Superconducting **transistor** acts as high-speed switch			
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MELCHER, J. A.			
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MENARD, W. A.			
A program for computing shock-tube gas dynamic properties			
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MESSINEO, S. M.			
Use of acrylic sheet molds for elastomeric products			
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METGER, G. W.			
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MICHAEL, J.			
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MIDLER, J. A., JR.			
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MILBERG, B. A.			
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MILL, T.			
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MILLER, A. C.			
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MILLER, C. G.			
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MILLER, J. S.			
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MILLER, L. J.			
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MILLER, M.			
Single-level resonance parameters fit nuclear cross-sections			
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MILLER, W. S.			
Metal cooldown, flow instability, and heat transfer in two-phase hydrogen flow			
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Heat-transfer data for hydrogen			
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MISRA, S. K.			
Oxidation resistant iron and nickel alloys for high temperature use			
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MOORE, C.			
Waveform simulator synthesizes complex functions			
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MOORE, M. L.			
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MOORE, T. J.			
Fabrication of hollow ball bearings by diffusion welding			
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MUIRHEAD, J. S.			
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MURACA, R. F.			
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M-FS-18495 B70-10409 07  
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M-FS-14797 B70-10107 05  
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OKUDA, A. S.  
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M-FS-18754 B70-10667 03  
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NPO-10417 B70-10226 03  
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ONLEY, A. G.  
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OSWIN, H. G.  
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OTHMAN, T. E.  
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PARKER, L. C.  
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M-FS-16730	B70-10455	07	COPTRAN - A method of optimum communication systems design	ERC-10273	B70-10501	09
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			Connector locking device	KSC-10537	B70-10553	01
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RADKE, R. P.			Dopant for sodium niobate capacitor dielectric	MSC-11773	B70-10190	01
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REHSTEINER, F. H.	Temperature-controlled fluidic device	A concept	HQ-10446	B70-10167	03	RODICK, R. G.	Highly stable biased amplifier and stretcher system	B70-10142
REID, J. H.	Stellar spectrum classifier	MSC-13450	B70-10319	03	RODER, H. H.	Uniform data system standardizes technical computations and the purchasing of commercially important gases	B70-10333	
REID, W. J.	Digital frequency discriminator	M-FS-14322	B70-10010	01	ROEHRIG, J.	Improved magnetron cold-cathode ion source	B70-10023	
REPAS, G.	Low-cost high-temperature brazing material	LEWIS-11209	B70-10672	04	ROGERO, R. S.	Heat-resistant pressure probe with high-frequency response	B70-10252	
RHODE, J. E.	Discharge coefficients for thick-plate orifices	LEWIS-11067	B70-10062	06	ROLLER, R. F.	Inexpensive automatic ranging for digital voltmeters and frequency counters	B70-10530	
RHODES, L. L.	High-powered automatic latching device	MSC-15474	B70-10198	07	RONAY, B. W.	Carriage-rail assembly for high-resolution mechanical positioning	B70-10714	
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RICHMAN, D.	Growth of single-crystal gallium nitride	ERC-10301	B70-10473	03	ROSITANO, S. A.	Ultra-flexible biomedical electrodes and wires	B70-10420	
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RICHTER, R.	Low pressure arc electrode	ARC-10012	B70-10329	01	ROTH, R. Y.	Time Data Sequential Processor /TDSP/	B70-10720	
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ROBELEN, D. B.	Miniature multicontact connectors	LANGLEY-10740	B70-10724	01				
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B70-10556	09	HQ-10426	B70-10645	04	M-FS-18844
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B70-10562	01	KSC-10397	B70-10651	01	LEWIS-11154
B70-10563	03	LEWIS-11096	B70-10652	07	LEWIS-11193
B70-10564	03	NUC-10530	B70-10653	07	MSC-13430
B70-10565	01	NUC-10389	B70-10654	08	M-FS-20823
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B70-10574	04	HQ-10574	B70-10663	08	M-FS-20876
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B70-10678	03	LEWIS-11170
B70-10679	07	MSC-15803
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B70-10681	03	M-FS-20554
B70-10683	03	NPO-11480
B70-10684	01	MSC-13637
B70-10686	03	NUC-10101
B70-10687	01	HQ-10594
B70-10688	07	MSC-13587
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